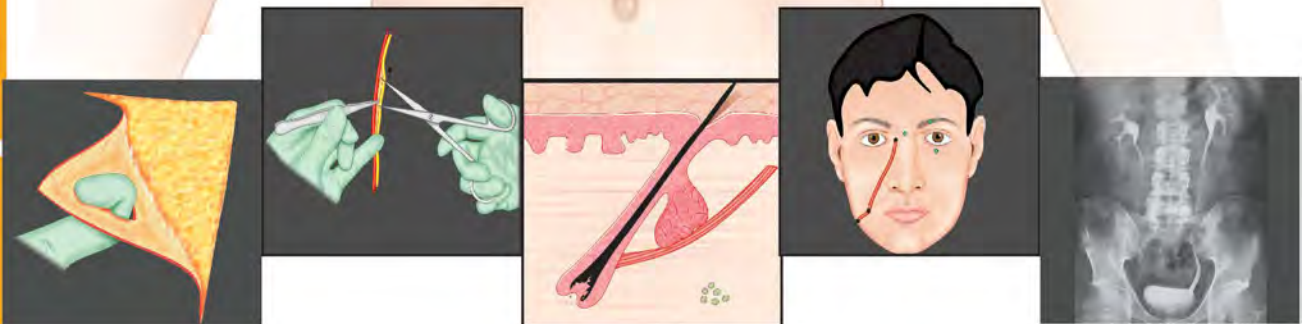


Exam-Oriented **Practical** **ANATOMY**

A Student's Manual

Window Dissections
Surface Anatomy
Histology
Radiological Anatomy



Tapan Kumar Jana



JAYPEE

Contents

SECTION 1: WINDOW DISSECTIONS

1. Window Dissections: Introduction 3

- Study of Anatomy 3
- Dissection 3
- Relative and Descriptive Terms in Anatomy 4
- Different Terminologies 5
- Structures Encountered in Dissection 7
- Procedure and Steps of Dissection 20

2. Window Dissections: Upper Limb (Superior Extremity) 30

Lesson 1: Introduction to Superior Extremity 30

Lesson 2: Clavipectoral Fascia (Pectoral Region) 34

- Steps of Dissection 34
- Attachment and Distribution of the Fascia 36
- Structures Piercing the Fascia 37
- Muscles Related to Clavipectoral Fascia 38

Lesson 3: Triangular and Quadrangular Space 42

- Steps of Dissection 42
- Muscles Related to Triangular and Quadrangular Space 45

Lesson 4: Axilla (Armpit) 48

- Steps of Dissection 48
- Identification of Different Nerves of Brachial Plexus 53
- Cords of Brachial Plexus 54
- Muscles of Axilla 54

Lesson 5: Front of Arm (Brachium) 60

- Steps of Dissection 60
- Principal Neurovascular Bundle 64
- Muscles Related to Front of the Arm 65
- Important Landmarks at the Middle of the Arm 65

Lesson 6: Cubital Fossa 68

- Steps of Dissection 69
- Muscles Related to Cubital Fossa 73

Lesson 7: Front of the Forearm 75

- Steps of Dissection 75
- Facts to be Noted 81
- Muscles Related to Front of Forearm 81

Lesson 8: Palm of the Hand 86

- Steps of Dissection 86
- Muscles on the Palm 94

Lesson 9: Back of the Arm 102

- Steps of Dissection 103

Lesson 10: Back of the Forearm 107

- Steps of Dissection 107
- Muscles Related to Back of the Forearm 112

Lesson 11: Dorsum of the Hand 115

- Steps of Dissection 116

3. Window Dissections: Lower Limb (Inferior Extremity)**121**

Lesson 1: Introduction to Inferior Extremity 121

Lesson 2: Femoral Triangle 125

- Steps of Dissection 125
- Muscles Related to Femoral Triangle 131

Lesson 3: Adductor Canal 143

- Steps of Dissection 143

Lesson 4: Anterolateral Compartment of the Leg 148

- Steps of Dissection 149
- Muscles Related to Anterolateral Compartment of Leg 153

Lesson 5: Dorsum of the Foot 158

- Steps of Dissection 158
- Muscles Related to the Dorsum of the Foot
(Intrinsic Muscles of the Dorsum) 161

Lesson 6: Gluteal Region 165

- Steps of Dissection 165
- Muscles Related to Gluteal Region 170

Lesson 7: Back of the Thigh 178

- Steps of Dissection 178
- Muscles of the Back of the Thigh 180

Lesson 8: Popliteal Fossa 184

- Steps of Dissection 184

Lesson 9: Back of the Leg (Posterior Crural Region) 192

- Steps of Dissection 192
- Muscles Related to the Back of the Leg 197

Lesson 10: Sole of the Foot 204

- Steps of Dissection 204
- Muscles Related to the Sole of the Foot 210

4. Window Dissections: Abdomen**217**

Lesson 1: Introduction to Abdomen 217

- Boundaries of the Abdomen 217
- Contents 218
- Relationship of the Abdomen to Other Regions 218
- Topographical Divisions of the Abdominal Wall 219

Lesson 2: Inguinal Canal 221

- Steps of Dissection 221

Lesson 3: Rectus Sheath 231

- Steps of Dissection 231

Lesson 4: Exposure of Kidney from Back 240

- Steps of Dissection 240

5. Window Dissections: Thorax**246**

Lesson 1: Introduction to Thorax 246

- Thoracic Cage 246
- Inlet of Thorax 246
- Outlet of Thorax 248

Lesson 2: Dissection of Intercostal Space (Upper Intercostal Spaces) 248

- Steps of Dissection 248

6. Window Dissections: Head and Neck**254**

Lesson 1: Introduction to Head and Neck 254

Lesson 2: Face 255

- Extent of Face 255
- Steps of Dissection 255
- Muscles Related to Face 261
- Muscles of Mastication 262

Lesson 3: Anterior Triangles of Neck 274

- Steps of Dissection 276
- Muscles Related to Anterior Triangle of Neck 284

Lesson 4: Posterior Triangles of Neck 298

- Steps of Dissection 299
- Muscles Related to Posterior Triangle of Neck 304

SECTION 2: SURFACE ANATOMY**7. Surface Anatomy: Upper Limb (Superior Extremity)****317**

Lesson 1: Points 317

- Head of Radius 317
- Head of Ulna 319
- Styloid Process of Radius 320
- Styloid Process of Ulna 320
- Pisiform Bone 321
- Tip of Coracoid Process 323
- Acromial Angle 325
- Hook of Hamate 326
- Bifurcation of Brachial Artery 326
- Beginning of Brachial Artery, Radial Nerve, Median Nerve and Ulnar Nerve 327

Lesson 2: Lines 330

- Radial Nerve in the Back of the Arm 330
- Ulnar Nerve in Forearm 331
- Axillary Artery 331
- Brachial Artery 333
- Radial Artery in the Forearm 334
- Ulnar Artery in Forearm 335
- Superficial Palmar Arch 337
- Flexor Retinaculum 338

8. Surface Anatomy: Lower Limb (Inferior Extremity)**341**

Lesson 1: Points 341

- Adductor Tubercle 341
- Tuberosity of Navicular 342
- Medial Malleolus 343
- Lateral Malleolus 344

Lesson 2: Lines 345

- Popliteal Artery 345
- Anterior Tibial Artery 347
- Posterior Tibial Artery 348
- Arteria Dorsalis Pedis 350

- Tibial Nerve in Popliteal Fossa 351
- Common Peroneal Nerve 353
- Deep Peroneal (Anterior Tibial) Nerve 355

9. Surface Anatomy: Abdomen

357

Lesson 1: Points 357

- Cardiac Orifice 357
- Pyloric Orifice 359
- Fundus of Gallbladder 361
- Appendicular Orifice 363
- McBurney's Point 364
- 4th Lumbar Spine 365
- Origin of Celiac Artery 367
- Origin of Superior Mesenteric Artery 368
- Duodenojejunal Flexure 369

Lesson 2: Lines 371

- Fundus of Stomach 371
- Lesser Curvature of Stomach 373
- Lower Border of Liver 374
- Root of the Mesentery 376
- Kidney from Back 377

10. Surface Anatomy: Thorax

380

Lesson 1: Points 380

- Tip of 9th Costal Cartilage 380
- Sternal Angle 382
- Apex of Heart 383
- Tracheal Bifurcation 384

Lesson 2: Lines 387

- Anterior Border of Left Lung 387
- Right Border of Heart 389
- Left Border of Heart 391
- Arch of Aorta 393
- Superior Vena Cava 394

11. Surface Anatomy: Head and Neck

396

Lesson 1: Points 396

- Supraorbital Notch 396
- Bifurcation of Common Carotid Artery 398
- Arch of Cricoid Cartilage 400
- Spine of 7th Cervical Vertebra 401
- Nasion 402

- Infraorbital Foramen 403
- Thyroid Prominence (Laryngeal Prominence) 404
- Tips of Greater Cornu of Hyoid 406

Lesson 2: Lines 407

- Isthmus of Thyroid Gland 407
- Lateral Lobe of Thyroid Gland 408
- Frontal Air Sinus 411
- Parotid Duct 412
- Right Common Carotid Artery 414
- Internal Carotid Artery 415
- Internal Jugular Vein 418
- External Jugular Vein 419
- Facial Artery in the Face 421
- Spinal Accessory Nerve 422
- Palatine Tonsil 425

SECTION 3: HISTOLOGY

12. Histology: Introduction

431

Lesson 1: Microscope 431

Lesson 2: Preparation of Tissue for Histological Study 433

- Steps 433

Lesson 3: Procedure of Hematoxylin and Eosin Staining 435

- Hematoxylin and Eosin (H&E) Staining Protocol 435

Lesson 4: Epithelial Tissue (Epithelium) 436

13. Histology: Musculoskeletal System

442

Lesson 1: Compact Bone 442

Lesson 2: Skeletal Muscle 449

Lesson 3: Cardiac Muscle 456

14. Histology: Blood Vascular System

460

Lesson 1: Arteries 460

Lesson 2: Veins 465

15. Histology: Gastrointestinal System

469

Lesson 1: Tongue 469

Lesson 2: Esophagus 475

Lesson 3: Stomach 477

Lesson 4: Duodenum 482

Lesson 5: Jejunum and Ileum 485

- Histological Comparison between Duodenum, Jejunum and Ileum 485

Lesson 6: Appendix 486

Lesson 7: Rectum (Large Intestine) 488

16. Histology: Liver and Pancreas (Both Exocrine and Endocrine Types of Gland) 492

Lesson 1: Liver 492

Lesson 2: Pancreas 501

17. Histology: Salivary Glands (Exocrine Glands) 508

Lesson 1: Parotid Gland 508

Lesson 2: Submandibular Gland 512

Lesson 3: Sublingual Gland 515

18. Histology: Endocrine Glands 517

Lesson 1: Thyroid Gland 517

Lesson 2: Adrenal Gland 521

19. Histology: Lymphatic System 526

Lesson 1: Lymph Node 526

Lesson 2: Thymus 532

Lesson 3: Spleen 538

Lesson 4: Palatine Tonsil 542

20. Histology: Respiratory System 545

Lesson 1: Trachea 545

Lesson 2: Lungs 549

21. Histology: Urinary System 558

Lesson 1: Kidneys 558

Lesson 2: Ureter 571

Lesson 3: Urinary Bladder 574

22. Histology: Male Reproductive System 577

Lesson 1: Testis 577

Lesson 2: Vas Deferens 584

Lesson 3: Prostate 585

23. Histology: Female Reproductive System	588
Lesson 1: Uterus	588
Lesson 2: Uterine Tubes	591
Lesson 3: Ovary	593
Lesson 4: Mammary Gland	599
24. Histology: Nervous System	603
Lesson 1: Spinal Cord	603
Lesson 2: Cerebellum	612
25. Histology: Integumentary System	620
Lesson 1: Skin	620
26. Histology: Identification of Histological Slides At a Glance	634

SECTION 4: RADIOLOGICAL ANATOMY

27. Radiological Anatomy: Introduction	641
General Considerations	641
28. Radiological Anatomy: Upper Limb (Superior Extremity)	647
Lesson 1: Shoulder Region	647
Lesson 2: Elbow Region	652
Lesson 3: Region of Wrist and Hand	657
29. Radiological Anatomy: Lower Limb (Inferior Extremity)	662
Lesson 1: Hip Region	662
Lesson 2: Knee Region	668
Lesson 3: Ankle and Foot	674
30. Radiological Anatomy: Abdomen	680
Lesson 1: Plain X-rays	680
• Abdomen	680
• Lumbosacral Spine	683
Lesson 2: Contrast X-rays	688
• Barium Meal X-ray (Contrast)	688
• Barium Follow Through	691
• Barium Enema	692

- Intravenous Pyelography 695
- Hysterosalpingography 698
- Cholecystogram 700

31. Radiological Anatomy: Thorax

703

Lesson 1: Plain X-rays 703

Lesson 2: Contrast X-rays 709

- Barium Swallow of Esophagus 709

32. Radiological Anatomy: Head and Neck

712

Lesson 1: Plain X-rays of Head and Neck Region 712

Index

731

Window Dissections: Lower Limb (Inferior Extremity)

- | | |
|---|--|
| <input type="checkbox"/> Introduction to Inferior Extremity | <input type="checkbox"/> Gluteal Region |
| <input type="checkbox"/> Femoral Triangle | <input type="checkbox"/> Back of the Thigh |
| <input type="checkbox"/> Adductor Canal | <input type="checkbox"/> Popliteal Fossa |
| <input type="checkbox"/> Anterolateral Compartment of the Leg | <input type="checkbox"/> Back of the Leg (Posterior Crural Region) |
| <input type="checkbox"/> Dorsum of the Foot | <input type="checkbox"/> Sole of the Foot |

LESSON 1: INTRODUCTION TO INFERIOR EXTREMITY

The inferior extremities or lower limbs of a human being are developed from the limb buds which appear as the outgrowths from the trunk at the fourth week of intrauterine life. The lower limb buds (one on each side) appear at the level between T₁₂ to S₄ segments of spinal cord which provide innervations to the lower limb.

The lower limb is connected to the trunk and is used for carrying the body weight and for propulsion. The pelvic girdle which is formed by the two hip bones connects the lower limb with the trunk. The two hip bones articulate with each other in front at the symphysis pubis and separated from each other by the sacrum behind.

Axial line is said to be the line of junction of two dermatomes supplied from discontinuous spinal levels. Though adjacent dermatomes overlap, no overlapping occurs across the axial line. **The anterior axial line** (Fig. 3.1) of the lower limb extends from the root of the penis (male) or clitoris (female) → across the front of the scrotum (male)/labia majora (female) → then spirals to the middle of the back of the thigh and leg → almost up to the heel. **The posterior axial line** (Fig. 3.1) starts from the L₄ spine → then across the gluteal region which undergoes a convex curve → lateral side of the back of the thigh and leg → stops above the heel. **It is probable that posterior axial lines do not exist, but evidence of anterior axial line is more convincing** (RJ Last). So, the **preaxial** border means the medial border and the **postaxial** border means the lateral border of the foot. **Due to the medial rotation of the lower limb bud**, the hallux (great toe) becomes medial. The great saphenous vein and the tibia are pre-axial in position, whereas the small saphenous vein and fibula are postaxial in position. Due to this rotation of the lower limb bud, the flexor surface of the lower limb becomes posterior and the extensor surface becomes anterior. This explains the nerve supply of the lower limb muscles where the anterior division of the lumbosacral plexus supplies the posterior surface and the posterior division supplies the anterior aspect of the lower limb.

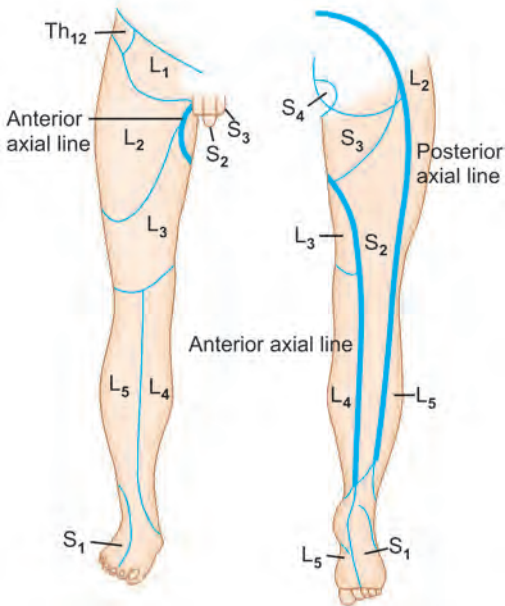


Fig. 3.1: Anterior and posterior axial lines

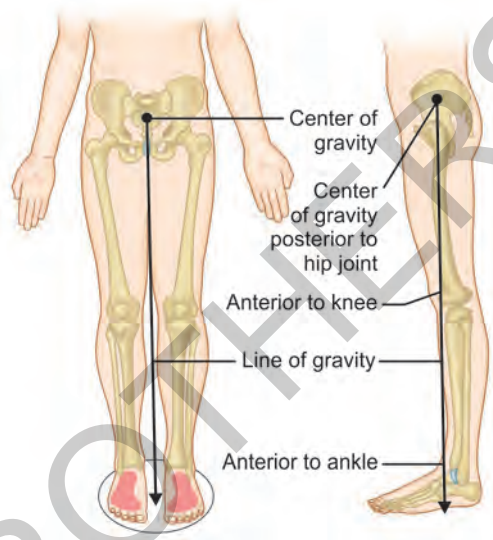


Fig. 3.2: Center of gravity and line of gravity

On the other hand, it is to be noted that **the upper limb bud rotates laterally** bringing the palm to face anteriorly so that the thumb is placed laterally. The preaxial border of the upper limb is lateral and the postaxial border is medial in position. The cephalic vein and radius become preaxial and the basilic vein and ulna become postaxial. Consequently, the flexor surface becomes anterior and the extensor surface becomes posterior due to this lateral rotation.

In upright posture, the body weight is transmitted through the acetabulum of the hip bone → Femur → Tibia → Foot. **In sitting posture**, the weight is transmitted to the ischial tuberosities. **So, we stand on S_1 and we sit on S_3 spinal nerves** (RJ Last). It is also observed that the line of center of gravity passes behind the hip joint and in front of the knee and ankle joints (Fig. 3.2). So, there is a natural tendency of backward tilting of the pelvis at the hip joint, hyper-extension of the knee joint and forward dislocation of the leg bones at the ankle joints. But these are prevented by the strong ligaments, antagonistic muscles and the bony configuration of the foot (**talus**).

For descriptive purpose, **the lower limb is divided into the following regions:**

- i. **Thigh** which extends from the hip to knee joint is having only one bone called femur (Fig. 3.3). The thigh can be divided into three compartments (Fig. 3.4): (a) Anterior or extensor, (b) Posterior or flexor and (c) Medial or adductor.
- ii. **Gluteal region** which lies above the posterior compartment of the thigh and behind the pelvis and hip.
- iii. **Leg** is the region between the knee and foot. It is having two bones called tibia and fibula (Fig. 3.5). The leg can be divided into three compartments (Fig. 3.6): (a) Anterior or extensor, (b) Posterior or flexor and (c) Lateral or peroneal.



Fig. 3.3: Femur

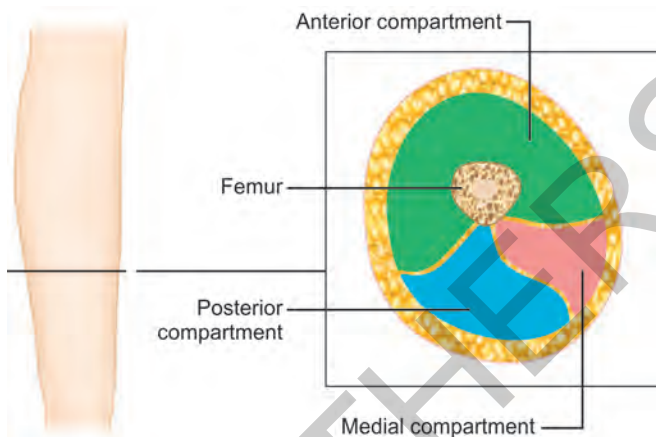


Fig. 3.4: Compartments of thigh

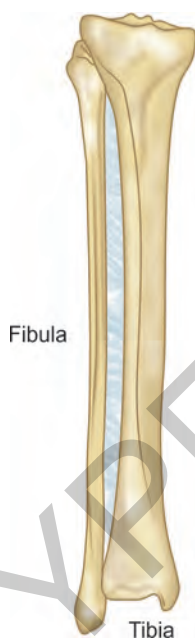


Fig. 3.5: Tibia and fibula

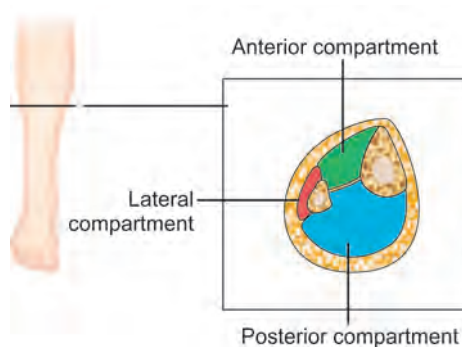


Fig. 3.6: Compartments of leg

iv. **Foot:** Skeleton of the foot consists of the following bones (Fig. 3.7):

- a. **Tarsal bones** (7): Calcaneum, talus, navicular, cuboid and 3 cuneiforms (medial, intermediate and lateral)
- b. **Metatarsal bones** (5): Named as 1st, 2nd, 3rd, 4th and 5th (from medial to lateral)
- c. **Phalanges** (14): 3 for each toe (proximal, middle and distal) except the great toe which has two phalanges (proximal and distal).



Fig. 3.7: Bones of the foot

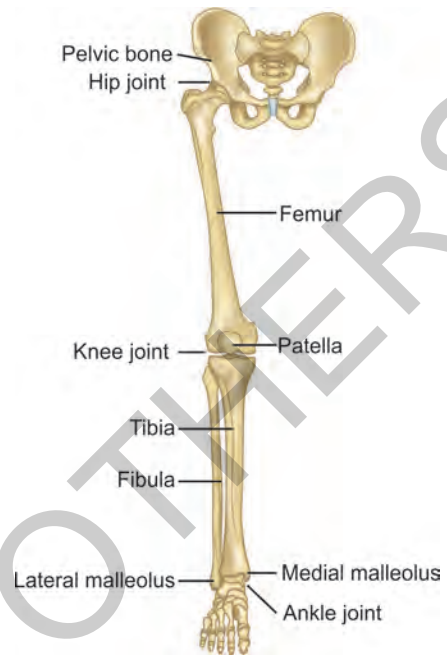


Fig. 3.8: Bones and joints of lower limb

The foot has an upper surface called dorsum of the foot and a plantar surface called sole of the foot.

The joints of the lower limb are as follows:

- i. Hip joints
- ii. Knee joints
- iii. Ankle joints
- iv. Tibiofibular joint (superior, intermediate and inferior)
- v. Subtalar and midtarsal joints
- vi. Other intertarsal joints
- vii. Tarsometatarsal joints (5)
- viii. Metatarsophalangeal joints (5)
- ix. Interphalangeal joints (proximal and distal). **Great toe is having only one interphalangeal joint.**

The bones and joints of the lower limb are shown in Figure 3.8.

The deep structures of these above regions are ensheathed by a jacket of common tubular connective tissue membrane called **deep fascia**. This deep fascia only changes its name from region to region such as **fascia lata in thigh, fascia cruris in leg and plantar aponeurosis in the sole of the foot.**

LESSON 2: FEMORAL TRIANGLE

Femoral triangle is a triangular area in front of the upper part of the thigh bounded **superiorly** by the **inguinal ligament**, **laterally** by the medial border of **sartorius muscle**, **medially** by the medial border of **adductor longus muscle** and its apex is the meeting point of medial border of sartorius and medial border of adductor longus (Fig. 3.9).

STEPS OF DISSECTION

1. **Position of the cadaver:** Body supine, thigh extended and laterally rotated.
2. **Skin incisions (Fig. 3.10):**
 - i. An oblique incision from the anterior superior iliac spine to pubic tubercle (A–B)
 - ii. Another transverse incision at the junction of upper 1/3rd and lower 2/3rd of the thigh (C–D)
 - iii. A vertical incision from the midpoint of (A–B) to the midpoint of (C–D) which is indicated by the line (E–F)

Now, reflect the skin flaps laterally and medially.

Superficial fascia is exposed.

3. **Superficial fascia:** In the superficial fascia, the following structures are identified (Fig. 3.11)
 - i. **Blood vessels:**
 - a. Great saphenous vein (on the medial aspect).
 - b. Superficial external pudendal vessels.
 - c. Superficial epigastric vessels.
 - d. Superficial circumflex iliac vessels.
 - ii. **Cutaneous nerves:**
 - a. Lateral femoral cutaneous nerve of thigh.
 - b. Intermediate femoral cutaneous nerve of thigh.

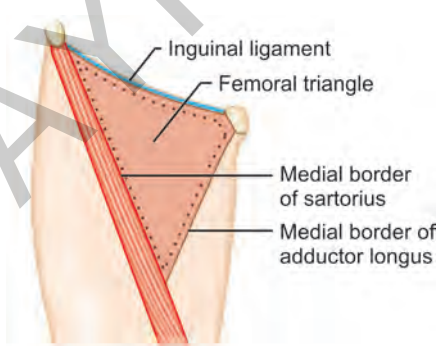


Fig. 3.9: Boundaries of femoral triangle

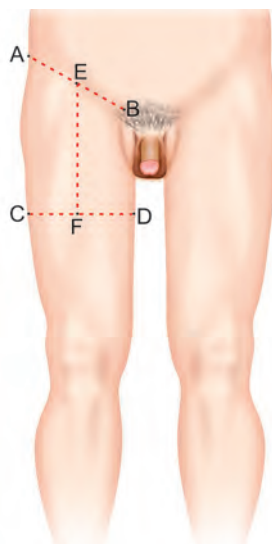


Fig. 3.10: Dissection of femoral triangle (skin incision)

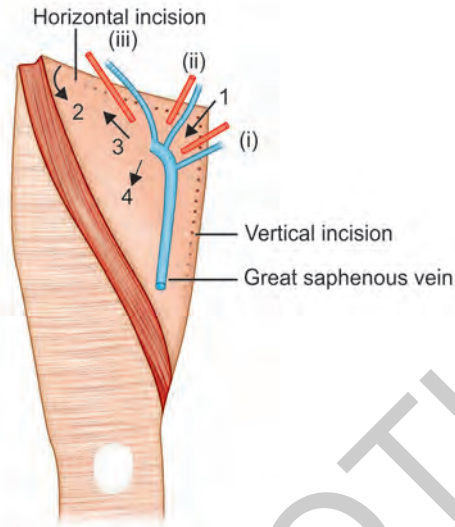


Fig. 3.11: Structures in superficial fascia: (i) Superficial external pudendal vessels; (ii) Superficial epigastric vessels; (iii) Superficial circumflex iliac vessels; (1) Branch of ilioinguinal nerve; (2) Branch of subcostal nerve; (3) Femoral branch of genitofemoral nerve; (4) Branch of medial femoral cutaneous nerve

- c. Medial femoral cutaneous nerve.
- d. Femoral branch of genitofemoral nerve.
- e. A twig from ilioinguinal nerve.

iii. **Lymphatics:**

- a. Superficial group of inguinal lymph nodes.
- b. Superficial lymph vessels.

Superficial fascia is reflected like skin.

Deep fascia is exposed.

4. **Deep fascia (fascia lata):** There is an oval and twisted gap in the upper and medial part of deep fascia. This opening is called **saphenous opening** which is closed by an areolar membrane called **cribriform fascia**. A number of structures are seen piercing the cribriform fascia. These structures are as follows (Fig. 3.12):
- i. Great (long) saphenous vein.
 - ii. Superficial external pudendal artery.
 - iii. Superficial epigastric artery.
 - iv. Few branches of medial femoral cutaneous nerve.
 - v. Few lymph vessels connecting the superficial and deep inguinal lymph nodes.

Remember that the superficial external pudendal **vein** and superficial epigastric **vein** do not pass through the saphenous opening. They accompany their corresponding arteries and drain into the great saphenous vein just before it pierces the cribriform fascia.

Now, insert your index finger into the **saphenous opening** beside the great saphenous vein. Then, you move your finger around the vein to define the margins of the saphenous opening. Trace the great saphenous vein up to its termination into the femoral vein.

Then, again insert your finger into the saphenous opening and push it inferiorly deep to the deep fascia until the fingertip touches the sartorius muscle.

Cut the deep fascia vertically downwards by using scissors from the lower margin of saphenous opening up to the sartorius muscle (Fig. 3.13, incision 1).

A second incision is made through the fascia lata from the upper margin of the saphenous opening. This incision extends laterally below and parallel to the inguinal ligament up to a point just below the anterior superior iliac spine (Fig. 3.13, incision 2).

A third incision is made through the fascia lata from the upper margin of the saphenous opening which extends medially below and parallel to the medial part of inguinal ligament up to a point just below the pubic tubercle (Fig. 3.13, incision 3).

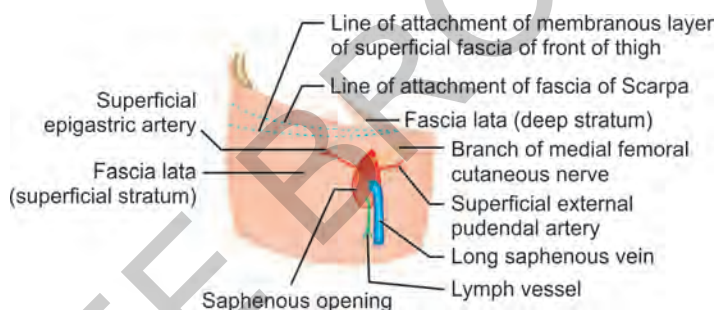


Fig. 3.12: Structures passing through the saphenous opening

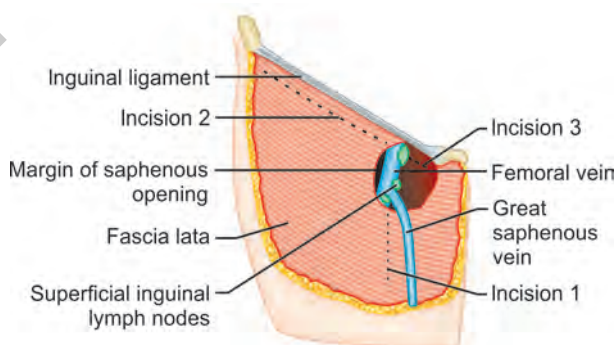


Fig. 3.13: Incisions on deep fascia

Then push your finger through these cuts and move them deep to the fascia lata to separate the deeper structure from the fascia lata.

Then reflect the flaps of fascia lata medially and laterally. Now the roof of the femoral triangle which is formed by the fascia lata (deep fascia of the thigh) is opened.

5. **Identify and clean the boundaries of the femoral triangle.**

The triangle is bounded **above** (base) by the **inguinal ligament**, laterally by the medial border of **sartorius muscle**, **medially** by the medial border of **adductor longus muscle** and the **apex** is formed by the junction of these above two muscles.

The contents of femoral triangle are as follows (Fig. 3.14):

- i. Femoral nerve and its branches.
 - ii. Femoral sheath with its contents.
 - iii. Terminal part of great saphenous vein.
 - iv. Femoral branch of genitofemoral nerve.
 - v. Lateral femoral cutaneous nerve (L_2, L_3).
6. **Femoral nerve** is seen to lie on the floor of the femoral triangle in the groove between the **iliacus** and **psaos major** muscle. It lies on the lateral side of the femoral artery and outside the femoral sheath. Clean and trace the femoral nerve inferiorly to expose its branches. It sends a branch to pectineus muscle called **nerve to pectineus** which passes medially behind the femoral sheath before the femoral nerve divides into anterior and posterior branches. Identify the **branches of anterior division** of femoral nerve which are as follows:

- i. **Muscular** (1): Nerve to sartorius.
- ii. **Cutaneous**:
 - a. Medial femoral cutaneous nerve.
 - b. Intermediate femoral cutaneous nerve.

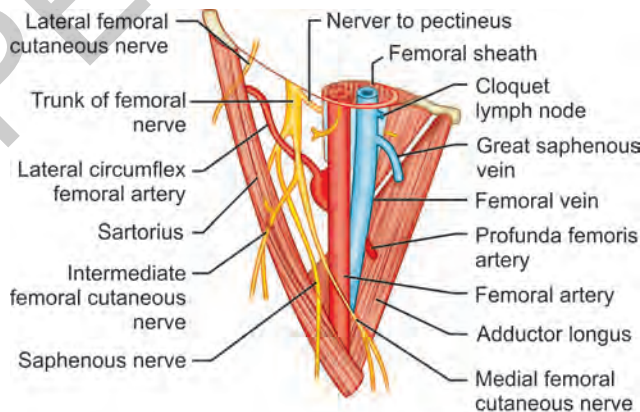


Fig. 3.14: Contents of femoral triangle

Identify the branches of **posterior division of femoral nerve**:

- i. **Muscular (4):**
 - a. Nerve to rectus femoris.
 - b. Nerve to vastus lateralis.
 - c. Nerve to vastus medialis.
 - d. Nerve to vastus intermedius.
- ii. **Cutaneous (1): Saphenous nerve.**

Remember that the lateral circumflex femoral vessels pass between the two divisions of femoral nerve.

7. **Femoral sheath** is identified.

Femoral Sheath (Figs 3.15A and B)

Definition: It is a funnel-shaped fibrous sheath around the proximal part of femoral vessels.

Formation:

- i. Anterior wall by fascia transversalis.
- ii. Posterior wall by fascia iliaca.

Shape: Funnel-shaped.

Lateral wall is vertical but the medial wall is oblique directing laterally and downwards.

Dimension:

- i. Length—about 3–4 cm.
- ii. Breadth—about 2 cm.

Compartment: **Three**, separated by two vertical septa.

- a. Lateral (**arterial**) compartment containing
 - i. Femoral artery.
 - ii. Femoral branch of genitofemoral nerve.
- b. Intermediate (**venous**) compartment containing
 - i. Femoral vein.
- c. Medial compartment (**femoral canal**) containing
 - i. Loose areolar tissue.
 - ii. Lymph node and lymph vessels.

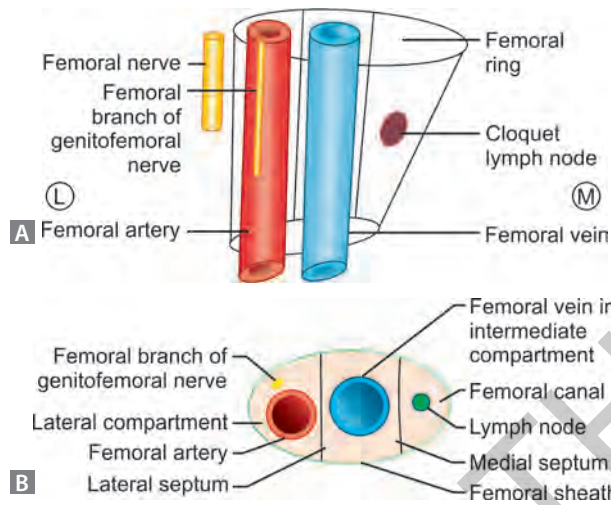
Function: It helps in free gliding of the femoral vessels in and out behind the inguinal ligament during the movements of the hip joint.

Changes with age: Femoral sheath is rudimentary in newborn and prolonged below the inguinal ligament after one year.

Structures piercing the sheath:

- a. **In front:**
 - i. Superficial external pudendal artery.
 - ii. Superficial epigastric artery.
 - iii. Superficial circumflex iliac artery.
 - iv. Deep external pudendal artery.
- b. **Laterally:** Femoral branch of genitofemoral nerve.
- c. **Medially:** Great saphenous vein.

Applied: Femoral hernia may occur through the femoral ring into the femoral canal.



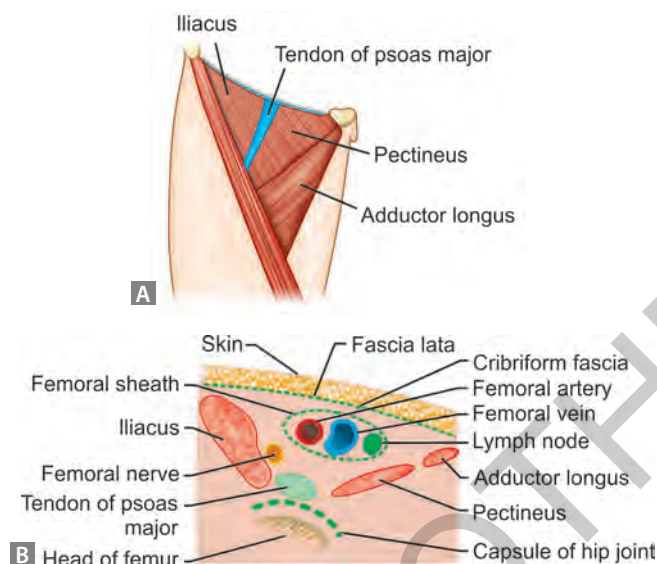
Figs 3.15A and B: Femoral sheath with its contents

The lateral compartment of the femoral sheath contains femoral artery. This artery is cleaned by using blunt dissection. **Three superficial branches** of femoral artery (**superficial external pudendal, superficial epigastric and superficial circumflex iliac**) arise just distal to the inguinal ligament. But do not attempt to follow these vessels.

The **largest** branch of femoral artery is the **arteria profunda femoris** which arises from the lateral side of the femoral artery about 3.5 cm below the inguinal ligament. Retract the femoral artery medially and identify the arteria profunda femoris. Very close to the femoral artery the profunda femoris artery gives off lateral and medial circumflex femoral artery. Identify these circumflex branches. The profunda femoris artery leaves the femoral triangle between pectineus and adductor longus muscle. Finally, this artery pierces the adductor magnus muscle as **the fourth perforating artery**. The femoral artery courses distally between the sartorius and adductor longus muscles.

Clean and identify the femoral vein and terminal part of great saphenous vein. Preserve this major vein but remove their tributaries to clear the dissection field.

8. **Floor of the femoral triangle** is cleaned by using blunt dissection. The floor of the triangle is formed by the following muscles from lateral to medial side (Figs 3.16A and B):
 - i. Iliacus.
 - ii. Psoas major.
 - iii. Pectineus.
 - iv. Adductor longus.



Figs 3.16A and B: Floor of femoral triangle

To expose of the obturator nerve the following steps of dissection are to be adopted.

- Adductor longus muscle is divided transversely 2–3 cm below its origin and turn the distal part towards the femur. **Anterior division** of obturator nerve is exposed lying on the adductor brevis.
- Then, adductor brevis is also cut transversely and reflected. **Posterior division** of the obturator nerve is exposed lying on the adductor magnus muscle.

MUSCLES RELATED TO FEMORAL TRIANGLE

Muscles	Origin	Insertion	Nerve supply	Action
Sartorius (Longest strap muscle)	i. Anterior superior iliac spine (ASIS) ii. Notch below ASIS	Upper part of the medial surface of the shaft of tibia	Anterior division of femoral nerve	i. Flexion, abduction and lateral rotation of the hip joint ii. Flexion and medial rotation of the knee in semiflexed position
Iliacus (Triangular muscle)	Upper 2/3rd of iliac fossa	About 2.5 cm below and in front of lesser trochanter of femur	From the trunk of femoral nerve (L_2, L_3)	Flexor of the hip joint

Contd...

Contd...

Muscles	Origin	Insertion	Nerve supply	Action
Psoas major (Fusiform muscle)	Medial part of anterior surface of transverse process and sides of bodies of all lumbar vertebrae (L ₁ -L ₅)	Anterior surface of lesser trochanter of femur	Directly from lumbar plexus (L ₂ , L ₃)	Chief flexor of the hip
Pectineus (Quadrilateral muscle)	i. Pectin pubis ii. Superior ramus of pubis	Pectineal line of the femur (line extending from the lesser trochanter to linea aspera)	i. Ventral stratum (lateral part) by the branch from trunk of femoral nerve ii. Dorsal stratum (medial part) by the anterior division of obturator nerve and accessory obturator nerve (if present)	Flexor and adductor of the hip
Adductor longus (Triangular in outline)	Anterior surface of symphysis pubis below the pubic tubercle.	Medial lip of linea aspera of the shaft of femur	Anterior division of obturator nerve	Adductor of thigh

Summary

1. Position of the cadaver: Supine, thigh extended and rotated laterally.
2. Skin incision as in Figure 3.10.
3. Superficial fascia and deep fascia are incised and reflected like skin.
4. **Boundaries** of the triangle are identified.
 - i. Base (above): Inguinal ligament.
 - ii. Laterally: Sartorius (medial border)
 - iii. Medially: Adductor longus (medial border)
 - iv. Apex: Junction of sartorius and adductor longus.
5. **Contents:**
 - i. Femoral nerve and its branches.
 - ii. Femoral sheath with its contents (femoral artery, femoral vein, lymphatics).
 - iii. Terminal part of great saphenous vein.
 - iv. Femoral branch of genitofemoral nerve.
 - v. Lateral femoral cutaneous nerve.

PROBABLE QUESTIONS AND ANSWERS



1. What are the boundaries of femoral triangle?

Ans. Laterally: Medial border of sartorius.

Medially: Medial border of adductor longus.

Exam-Oriented Practical ANATOMY

A Student's Manual

The present volume showcases the essential information required by undergraduate students in preparing for the anatomy practical examinations. All sections of this book contain a summary of the relevant information along with probable questions that the students may have to face and their appropriate answers. The book will be a useful companion both in the practical classes and at examination time. The sections are organized as follows:

- **Window dissections:** For cadaveric dissections, the description follows the classroom pattern of incisions, superficial structures, deeper structures, neurovascular bundles and probable questions to be faced in the viva examination.
- **Surface anatomy:** Clear instructions for drawing both lines and points are given along with accurate descriptions of the structures to be examined and drawn.
- **Histology:** Salient features for identification of slides are presented in order of importance. This is accompanied by detailed questions and answers covering further aspects of the tissues examined.
- **Radiological anatomy:** All normal anatomical landmarks and features are mentioned with regard to plain and special radiographs. Further questions on finer structures are mentioned as additional information.

The overall planning of the book attempts to present all anatomical information in a pleasant and palatable format to make the study of anatomy a pleasant and memorable experience.

Tapan Kumar Jana MBBS DGO MS FAIMS is an eminent teacher of anatomy from West Bengal, India. He is currently Associate Professor, Department of Anatomy at Calcutta National Medical College, Kolkata, West Bengal. He graduated from Burdwan Medical College, West Bengal in 1987 and completed his postgraduation in anatomy from the same institution in 1997. He became the 'Fellow of All India Medicos Society' in 1988. In his teaching career in anatomy spanning over about 25 years, he has been posted at several medical colleges all over West Bengal. He made an impact of his excellence as a teacher and guide of undergraduate and postgraduate students. He is very much popular among the students for his better understanding of the lacunae of knowledge of the students and his excellence in the way of teaching. He has acted as an examiner in anatomy in many medical colleges in and outside West Bengal. He has been acting as research guide for the postgraduate students for last nine years. He also acted as evaluator of thesis for MD (Anatomy) and became postgraduate examiner. He has also been a paper setter in anatomy in several universities in neighboring states. He has several research papers to his credit in national and international medical journals and is currently engaged in many research projects. His wide ranging interests include the propagation of the knowledge of human body structure among budding medicos in a simple and straightforward manner so that the essential facts are retained throughout the lifetime of the students.



Available at all medical bookstores
or buy online at www.jaypeebrothers.com



JAYPEE BROTHERS
Medical Publishers (P) Ltd.
www.jaypeebrothers.com

Join us on [facebook.com/JaypeeMedicalPublishers](https://www.facebook.com/JaypeeMedicalPublishers)

Shelving Recommendation
ANATOMY

ISBN 978-93-86150-95-0



9 789386 150950