

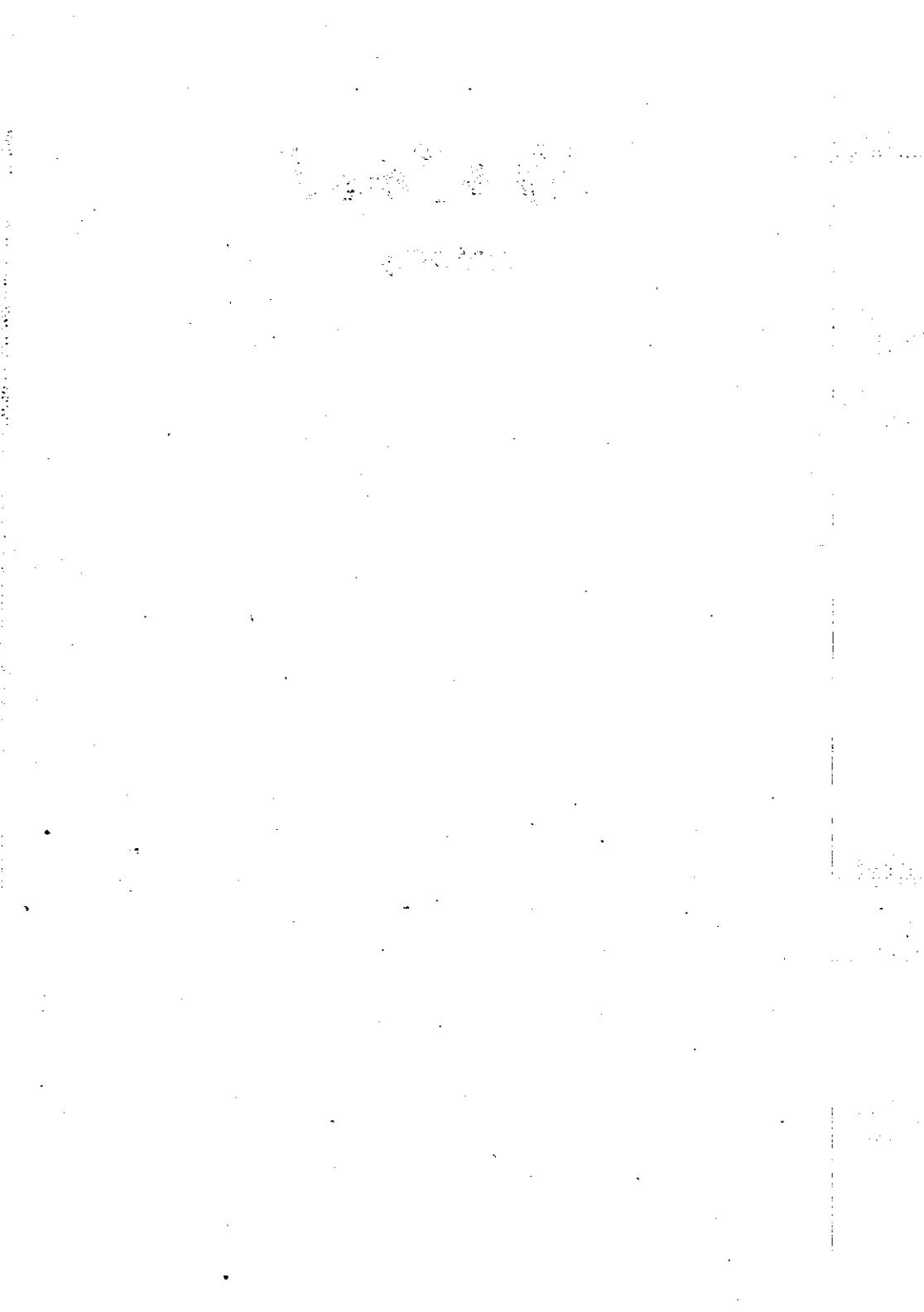
FirsTest

Anatomy

First
Edition

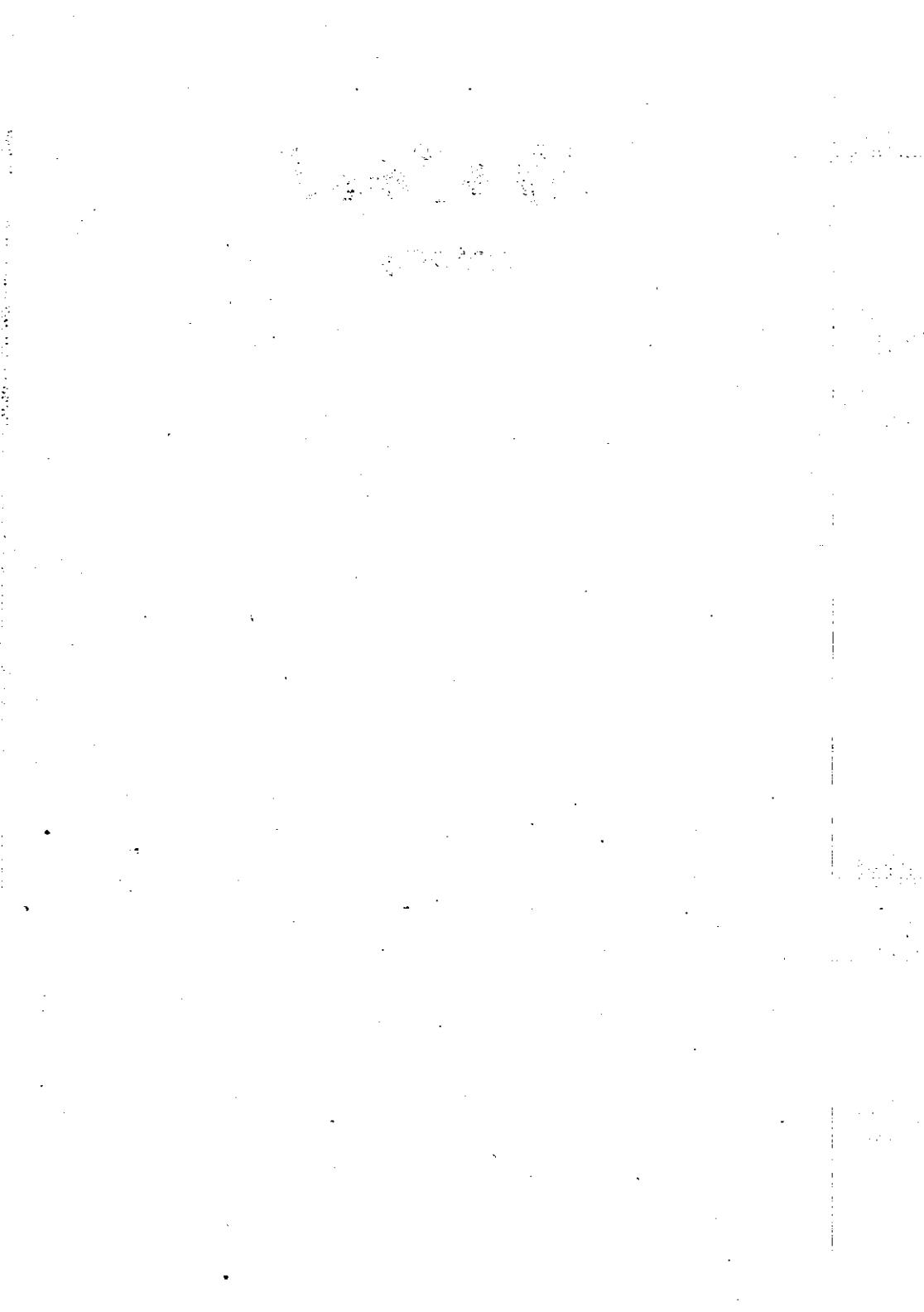
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Dr Suyog Santosh Moon



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Anatomy



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First Edition

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KALAM BOOKS

Anatomy: FirsTest

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Contents

<i>Introduction</i>	VIII
Head & Neck	
<i>Questions</i>	1
<i>Answers, Explanations, and References</i>	12
Neuroanatomy	
<i>Questions</i>	54
<i>Answers, Explanations, and References</i>	58
Abdomen	
<i>Questions</i>	72
<i>Answers, Explanations, and References</i>	84
Lower limb	
<i>Questions</i>	134
<i>Answers, Explanations, and References</i>	141
Thorax	
<i>Questions</i>	169
<i>Answers, Explanations, and References</i>	177
Histology	
<i>Questions</i>	200
<i>Answers, Explanations, and References</i>	204
Joints	
<i>Questions</i>	212
<i>Answers, Explanations, and References</i>	213

Embryology

Questions	215
Answers, Explanations, and References	223

Upper Limb

Questions	246
Answers, Explanations, and References	254

Miscellaneous

Questions	269
Answers, Explanations, and References	285

The important examinations covered in this book (with code word in the bracket) are:

EXAMINATIONS	CODE USED
1. Armed Forces Medical College, Pune	(AFMC)
2. AIIMS Entrance Examination	(AIIMS)
3. All India Post graduate Entrance Examination	(AI)
4. Andhra Pradesh PG Entrance Examination	(AP)
5. Army Medical Corps Entrance Examination	(AMC)
6. Aligarh Muslim University PG Entrance Examination	(AMU)
7. PG Entrance Examination, Varanasi	(BHU)
8. Burdwan University	(BURDWAN)
9. Bihar MD Entrance Examination	(BIHAR)
10. Central Institute of Psychiatry, Ranchi	(CIP)
11. Civil Services Entrance Examination, Part I (Medicine)	(CS)
12. Christian Medical College, Vellore	(CMC)
13. Calcutta University Entrance Examination	(CU)
14. Diplomate of National Board Entrance Examination	(DNB)
15. Delhi MD Entrance Examination	(DELHI)
16. Haryana P.G. Entrance	(HARYANA)
17. Jammu & Kashmir P.G. Entrance	(J&K)
18. Jharkhand PG Entrance Examination	(JPG)
19. JIPMER PG Entrance Examination	(JIPMER)
20. Kerala State PG Entrance	(KERALA)
21. Karnataka State PG Entrance	(KAR)
22. Manipal Academy of Higher Education PG Entrance	(MAHE)
23. Maharashtra State PG Entrance	(MH)
24. Madhya Pradesh State PG Entrance	(MP)
25. NIZAM's Institute of Medical Sciences, Hyderabad	(NIMS)
26. NIMHANS PG Entrance, Bangalore	(NIMHANS)
27. Orissa State PG Entrance	(ORISSA)
28. PGI MD Entrance Examination	(PGI)
29. Punjab State PG Entrance	(PUNJAB)
30. Rajasthan State PG Entrance	(RAJASTAN)
31. Rohtak PG Entrance	(ROHTAK)
32. Sri chitra Tirunal Institute of Medical Sciences, Trivandrum	(SCTIMS)
33. Sanjay Gandhi Institute of Post Graduation, Lucknow	(SGPGI)
34. Sri Rama Chandra Medical College, Chennai	(SRMC)
35. Tamil Nadu State PG Entrance	(TN)
36. Tamilnadu public service commission	(TNPSC)
37. Uttar pradesh State PG Entrance	(UP)
38. Combined Medical Services Examination by UPSC	(UPSC)
39. Consortium of Medical, Engineering and Dental Colleges - Karnataka	(COMED-K)

S.No.	Reference Title	Author	Edition	Vol	Code
1.	Human Anatomy	B.D. Chaurasia	4th	I	BDC I
2.	Human Anatomy	B.D. Chaurasia	4th	I	BDC II
3.	Human Anatomy	B.D. Chaurasia	4th	III	BDC III
4.	Embryology	Inderbir Singh	6th		B

Head & Neck

Questions

- 1. Mandibular nerve lesion at origin involves all except (AIIMS 97)**
a. Buccinator
b. Masseter
c. Tensor palati
d. Tensor tympani

- 2. The factor/s responsible for viscosity of synovial fluid is/ are : (AIIMS 80, UPSC 85)**
a. Chondroitin sulphate
b. Hyaluronic acid
c. Heparin sulphate
d. All of the above

- 3. Carotid sheath contains all except : (PGI 88)**
a. Carotid artery
b. Internal jugular vein
c. Vagus nerve
d. Phrenic nerve

- 4. Secretomotor fibres to the parotid gland is via (PGI - 88)**
a. Auriculotemporal nerve
b. Facial nerve
c. Trigeminal nerve
d. Maxillary nerve

- 5. The pterion corresponds to the following except - (Karnataka 96)**
a. Anterior pole of insula
b. Middle meningeal artery
c. Transverse sinus
d. Lateral cerebral sulcus

- 6. Cusp of carabelli is seen in - (TN.99)**
a. I molar upper
b. II molar upper
c. III molar upper
d. III molar lower

2 Anatomy

- 7. Treatment of choice for subgaleal hematoma - (AI 88)**
- a. Incision and evacuation
 - b. Needle aspiration
 - c. Antibiotics and then drain
 - d. Conservative
- 8. Horner's syndrome is produced due to the pressure on - (AI 95)**
- a. Stellate ganglion
 - b. Spinal cord
 - c. Parasympathetic ganglion
 - d. Celiac ganglion
- 9. Inferior thyroid artery ligation in sub-total thyroidectomy is done (PGI - 88)**
- a. As close to the thyroid
 - b. As far as possible
 - c. As its origin
 - d. Anywhere
- 10. Dangerous area of the face is - (PGI - 96)**
- a. Above the line joining tragus to the nasal fold
 - b. Area drained by angular facial vein
 - c. Spheno - ethmoidal recess
 - d. All of the above
- 11. Chassaignac's tubercle is - (PGI 79, AIIMS 84)**
- a. Below the level of cricoid cartilage
 - b. Above the level of cricoid cartilage
 - c. At the same level as cricoid cartilage
 - d. Present at C7 level
- 12. Increased thickness of skull bones is seen in- (PGI 80, AIIMS 85, DELHI 92)**
- a. Thalassemia
 - b. Renal osteodystrophy
 - c. Osteomalacia
 - d. Sarcoidosis
- 13. Lacrimation does not occur when facial nerve injury is at - (AI - 98)**
- a. Geniculate ganglion
 - b. In semicircular canal
 - c. At sphenopalatine ganglia
 - d. At mastoid foramen

14. Mastoid process antrum begins to develop in the (JIPMER 80, DELHI 87)
- 6th month
 - 9th month
 - 1st year
 - 2nd year
15. Veins communicating the cavernous sinus to pterygoid plexus pass through : - (PGI 80, AMU 87)
- Scarpa
 - Vesaljus
 - Ovale
 - Langer
16. Internal thoracic veins are tributaries of the (PGI 81, DELHI 83)
- Azygos
 - Subclavian
 - Internal jugular
 - Brachiocephalic
17. Isthmus of the thyroid gland is across tracheal rings - (AMC 81)
- 2nd - 4th
 - 3rd - 5th
 - 5th - 6th
 - 4th only
18. Internal laryngeal nerve supplies - (JIPMER 81, DNB 90)
- Cricothyroid muscle
 - Vocalis
 - Mucous membrane below vocal fold
 - None of above
19. The Ansa cervicalis innervates which muscle - (AIIMS 82)
- Mylohyoid
 - Cricothyroid
 - Stylohyoid
 - Sternohyoid

4 Anatomy

- 20. Which of the following statements regarding the pharynx is/ are correct - (PGI 82)**
- a. The opening of the auditory tube is located in the lateral wall of the nasopharynx
 - b. The soft palate is at the level of separation of the nasopharynx and the oropharynx
 - c. The pharynx is continuous with the oesophagus at the level of the sixth cervical vertebra
 - d. The afferent limb of the gag reflex is cranial nerve X; the efferent limb is cranial nerve IX
- 21. The number of ossification centres for the hyoid bone is :- (AMU 82)**
- a. 3
 - b. 4
 - c. 5
 - d. 6
- 22. In the mediastinum - (PGI 82, 85)**
- a. The left brachiocephalic vein passes anterior to the brachiocephalic artery
 - b. The ligamentum arteriosum inter-connects the aortic arch and the left pulmonary vein
 - c. The left recurrent laryngeal nerve passes under the arch of aorta
 - d. The thoracic duct is found between the esophagus and the trachea
- 23. What is not true of facial artery - (PGI 85)**
- a. Main source of oxygenated blood to palatine tonsil
 - b. Is a branch of internal carotid artery
 - c. Supplies branches to both upper and lower lips
 - d. Conveys post ganglionic sympathetic nerve fibres to the submandibular gland
- 24. Damage to the internal laryngeal nerve results in - (PGI 85)**
- a. Hoarseness
 - b. Loss of timbre of voice
 - c. Anaesthesia of larynx
 - d. Breathing difficulty
- 25. Foramen transversarium transmits : (AIIMS 85)**
- a. Inferior jugular vein
 - b. Inferior petrosal sinus
 - c. Sigmoid sinus
 - d. Vertebral artery

- 26. Superior parathyroid glands are derived from - (PGI 86, Delhi 85)**
- a. 1st branchial pouch
 - b. 3rd branchial pouch
 - c. 4th branchial pouch
 - d. 5th branchial pouch
 - e. None of the above
- 27. Arcuate eminence of petrous temporal bone is caused by - (AIIMS 87)**
- a. Superior semicircular canal
 - b. Posterior semicircular canal
 - c. Lateral semicircular canal
 - d. Cochlea
- 28. Root value of phrenic nerve is - (Kerala 88, JIPMER 86)**
- a. C₂, C₃, C₄
 - b. C₁, C₂, C₃
 - c. C₃, C₄, C₅
 - d. C₅, C₆, C₇
- 29. Middle thyroid vein drains into _____ vein (PGI 88)**
- a. External jugular
 - b. Anterior jugular
 - c. Internal jugular
 - d. Brachiocephalic vein
- 30. Ophthalmic artery is a branch of _____ part of Internal carotid artery (PGI 88)**
- a. Intracavernous
 - b. Intrapetrous
 - c. Intracerebral
 - d. Extra cranial
- 31. Structures passing through foramen ovale - (PGI 88)**
- a. Emissary vein
 - b. Mandibular nerve
 - c. Trigeminal nerve
 - d. All
- 32. Where is ciliary ganglion located in the orbit - (PGI -89)**
- a. Between optic nerve and lateral rectus
 - b. Apex of orbit
 - c. Apex of orbit & superior rectus
 - d. Apex of orbit between optic nerve & lateral rectus

6 Anatomy

- 33. Regarding palatine tonsil, which of the following is an incorrect statement (PGI 89)**
- a. Lies on the superior constrictor
 - b. Lymph from it drains into the deep cervical nodes
 - c. Has sensory innervation from vagus
 - d. Is a derivative of the second pharyngeal pouch.
- 34. Retraction of protruded mandible is done by - (JIPMER 90)**
- a. Medial pterygoid
 - b. Lateral pterygoid
 - c. Masseter
 - d. Temporalis
- 35. Excessive hemorrhage in tonsillectomy results from injury to - (AI 90)**
- a. Ascending palatine artery
 - b. Venous commitants of facial artery
 - c. Palatine vein
 - d. Internal carotid artery
- 36. Which structure passes through the infra orbital fissure - (TN 90)**
- a. Superior ophthalmic vein
 - b. Ophthalmic artery
 - c. Trochlear nerve
 - d. Zygomatic nerve
- 37. Posterior chamber of the eye refers to the space (JIPMER 91)**
- a. Posterior to lens
 - b. Posterior to cornea
 - c. Posterior to iris
 - d. None
- 38. Circulus iridis major is situated in - (AIIMS 91)**
- a. Pupillary border of iris
 - b. Greater collarette
 - c. Ciliary body
 - d. Root of iris
- 39. Seventh, ninth and 10th cranial nerves end in- (JIPMER 92)**
- a. Nucleus tractus solitarius
 - b. Nucleus ambiguus
 - c. Dorsal nucleus of vagus
 - d. Long tract of V nerve

- 40. Choroid fissure of the eye permits the entry of - (DNB 92)**
- a. Choroid plexus
 - b. Ciliary arteries
 - c. Central artery of the retina
 - d. Hyaloid artery
- 41. Root of tooth contains all the following except - (PGI 93)**
- a. Enamel
 - b. Pulp chamber
 - c. Dentine
 - d. Cementum
- 42. The vein of galen drains into - (AI 93)**
- a. IVC
 - b. Straight sinus
 - c. Superior sagittal sinus
 - d. SVC
- 43. True about the 4th ventricle is - (DELHI 93)**
- a. Rhomboid fossa forms floor
 - b. Choroid plexus lies at its floor
 - c. Connections between two cerebral hemispheres
 - d. Lies inferior to inferior cerebellar peduncles
- 44. Hassals corpuscles are seen in (Kerala 94)**
- a. Thymus
 - b. Spleen
 - c. Lymph node
 - d. Appendix
- 45. Which of the following does not pass through superior orbital fissure - (AIIMS 94)**
- a. Oculomotor nerve
 - b. Optic
 - c. Ophthalmic division of trigeminal nerve
 - d. Trochlear
- 46. Crano facial angle is - (JIPMER 95)**
- a. 110°
 - b. 120°
 - c. 130°
 - d. 140°

8 Anatomy

- 47. Which of the following structure is inferior to the sphenopetrosal synchondrosis - (JIPMER 95)**
- a. Abducent nerve
 - b. Osseous part of auditory tube
 - c. Cartilaginous part of auditory tube
 - d. Petrosquamous sinus
- 48. All are true about vocal ligaments except (JIPMER 95)**
- a. It is medial to vocalis
 - b. It is discontinuous with cricothyroid membrane
 - c. It is lined by stratified squamous
 - d. It is fibro elastic tissue
- 49. All of the following structures are in the lateral wall of cavernous sinus except - (Kerala 95)**
- a. Oculomotor N
 - b. Trochlear N
 - c. Trigeminal N
 - d. Ophthalmic N
- 50. Which nerve passes through Meckel's cave - (AMU 95)**
- a. Abducent
 - b. Facial
 - c. Trigeminal
 - d. Trochlear
- 51. Cranial accessory nerve supplies - (AI 96)**
- a. Sternomastoid
 - b. Trapezius
 - c. Splenius capitis
 - d. Soft palate
- 52. Main nerve supply of the tonsil is from - (TN 87)**
- a. Lesser palatine nerve
 - b. Greater palatine nerve
 - c. Glossopharyngeal nerve
 - d. Facial nerve
- 53. Which is true regarding parotid gland (AI 90)**
- a. Stenson's and wharton's duct join and open at the upper second molar teeth
 - b. Stensons duct opens opposite upper second molar teeth
 - c. Parotid duct pierces the masseter
 - d. Developed from mesoderm

- 54. Which of the following statements regarding middle constrictor muscle is wrong (TN 92)**
- a. Lies on superior constrictor
 - b. Lymph from it drains into the deep cervical lymph nodes
 - c. Has sensory innervation from vagus
 - d. Is a derivative of the second pharyngeal arch
- 55. Palsy of the right genioglossus causes - (UP 96)**
- a. Deviation of tongue to right
 - b. Deviation of tongue to left
 - c. Deviation of soft palate to right
 - d. Deviation of soft palate to left
- 56. Waldeyer's lymphatic chain is formed by all except : (Kerala 96)**
- a. Palatine tonsils
 - b. Pharyngeal tonsils
 - c. Tubal tonsils
 - d. Post. auricular nodes
- 57. Which one of the following is a branch of facial nerve (Karnataka 96)**
- a. Deep petrosal nerve
 - b. Lesser superficial petrosal nerve
 - c. External petrosal nerve
 - d. Greater superficial petrosal nerve
- 58. Nerve of pterygoid canal is (PGI 96)**
- a. Sympathetic + lesser petrosal nerve
 - b. Sympathetic + greater petrosal nerve
 - c. Chorda tympani
 - d. Jacobson's nerve
- 59. Transverse ligament of atlas is part of - (CUPGEE 99)**
- a. Cruciate ligament
 - b. Ligament flava
 - c. Anterior longitudinal ligament
 - d. Posterior longitudinal ligament
- 60. Which nerve is in close relation with root of the lower third molar - (Karnataka 99)**
- a. Inferior alveolar nerve
 - b. Chorda tympani
 - c. Lingual nerve
 - d. Mylohyoid nerve

10 Anatomy

- 61. Middle cranial fossa is supplied by - (MP 2K)**
- a. Maxillary nerve
 - b. Mandibular nerve
 - c. Anterior ethmoidal nerve
 - d. Posterior ethmoidal nerve
- 62. Posterior fontanelles are ossified at the age of - (HPU 2001)**
- a. 6 months
 - b. 2 yrs
 - c. 3 yrs
 - d. 4 yrs
- 63. Trigeminal nerve has how many nuclei in C.N.S. - (JIPMER 2002)**
- a. Three
 - b. Four
 - c. Five
 - d. Six
- 64. Portal circulation is seen in which of the following endocrine gland - (JIPMER 2002)**
- a. Pineal gland
 - b. Hypophysis cerebri
 - c. Pancreas
 - d. Ovary
- 65. The following ligaments are present in temporomandibular joint except - (TN 2002)**
- a. Lateral temporomandibular ligament
 - b. Sphenomandibular ligament
 - c. Styломандибуляр ligament
 - d. Alar ligament
- 66. Branchial sinus passes between (PGI 2000)**
- a. Two carotids
 - b. IJV & Carotid
 - c. Superficial to ECA
 - d. Posterior mediastinum
- 67. Anatomic site of origin of stridor is - (PGI 2000)**
- a. Larynx
 - b. Bronchus
 - c. Bronchiole
 - d. Trachea

- 68. Which of the following statements is correct regarding the trachea - (PGI 01)**
- a. During deep inspiration, the tracheal bifurcation may descent to T6 level
 - b. The left bronchus is wider and shorter
 - c. The arch of aorta lies on the right bronchus and is anterior to it
 - d. The sensory supply of trachea is by the vagus
- 69. Which of the following statements is true regarding the pituitary gland - (PGI 01)**
- a. It is separated from the optic chiasma by the sella turcica
 - b. It is situated deep in the sella
 - c. The sphenoidal air cells lie inferior to it
 - d. It develops from the base of the 3rd ventricle from the pars anterior
 - e. It is supplied by a branch of the internal carotid artery
- 70. Nasal septum is formed by - (PGI 03)**
- a. Lateral cartilage
 - b. Crest of maxilla
 - c. Septal cartilage
 - d. Perpendicular plate of ethmoid
 - e. Nasal bone
- 71. How many lymph nodes are there in cervical group - (Kerala 2003)**
- a. 100
 - b. 200
 - c. 300
 - d. 400
- 72. Muscle not arising from oblique line of thyroid cartilage - (Manipal 2004)**
- a. Thyrohyoid
 - b. Cricothyroid
 - c. Cricoarytenoid
 - d. None
- 73. Which is not found on the lateral wall of the nose ? (BIHAR 03)**
- a. Infundibulum
 - b. Superior concha
 - c. Lamina papyracea
 - d. Bulla ethmoidalis

Head & Neck

Answers

1. (a) Buccinator (Ref: B.D.C 4th ed vol III - pg153, 289)

♦ Buccinator is supplied by the facial nerve. It's paralysis causes dribbling of saliva

♦ Mandibular nerve :

- It is the largest of the three divisions of Trigeminal nerve
- Both sensory and motor fibres
- Nerve of the first branchial arch
- Mandibular nerve begins in the middle cranial fossa through a large sensory root and a small motor root.
- Leaves the cranial cavity through foramen ovale
- The main trunk lies in the infratemporal fossa

Branches :

(A) Main trunk

- (1) Meningeal branch
- (2) Nerve to medial pterygoid
- (3) Tensor veli palatini
- (4) Tensor tympani
- (5) Medial pterygoid

(B) Anterior trunk of main trunk :-

- (1) Buccal nerve - sensory
- (2) Masseteric nerve
- (3) Deep temporal nerve } Motor branches
- (4) Nerve to lateral pterygoid

(C) Posterior trunk of main trunk :-

- (1) Auriculotemporal nerve
- (2) Lingual nerve
- (3) Inferior alveolar nerves

♦ Buccal nerve is the only sensory branch of the anterior division of the mandibular nerve

2. (b) Hyaluronic acid

(Ref: Gray's Anatomy 39th ed, pg 110)

The composition of synovial fluid is consistent with it being mainly a dihydrate of blood plasma

Contains :-

- ♦ Protein (0.9mg/100ml) derived from blood with addition of hyaluronan, a sulphate free GAG containing equimolar concentrations of glucuronic and N- Acetyl glucosamine

- ◆ The viscoelastic and thixotropic (plastic) properties of synovial fluid are largely attributable to its hyaluronan content.
- ◆ Fluid contains a few cells (60 per ml in resting human joints). Higher counts are found in young individuals.

3. (d) Phrenic nerve (Ref: B.D.C 4th ed vol III - pg 68)

Carotid sheath :-

- ◆ It is a condensation of the fibroareolar tissue around the main vessels of the neck

Contents :

- ◆ Common and Internal carotid arteries
- ◆ Internal jugular vein
- ◆ Vagus nerve

Relations :-

- ◆ The ansa cervicalis lies embedded in the anterior wall of the carotid sheath
- ◆ The cervical sympathetic chain lies behind the sheath, plastered to prevertebral fascia
- ◆ The sheath is overlapped by the anterior border of the sternocleidomastoid

4. (a) Auriculotemporal nerve (Ref: B.D.C 4th ed vol III - pg 137)

Parotid gland :

Nerve supply

(a) Parasympathetic

(b) Sympathetic

(c) Sensory

(a) Parasympathetic nerves are secretomotor and reach the gland via auriculotemporal nerve

Inferior salivatory nucleus



Glossopharyngeal nerve



Its tympanic branch



Tympanic plexus



Lesser petrosal nerve



Relay in Otic ganglion



Post-ganglionic fibres pass through auriculotemporal nerve & reach the gland

(c) Sensory nerves to the gland come from the auriculotemporal nerve, the parotid fascia is innervated by sensory fibres of the great auricular nerve (C_2)

14 Anatomy

- ◆ Parotid swellings are painful due to unyielding nature of the parotid fascia
 - ◆ A parotid abscess may be caused by infection from the mouth cavity
 - ◆ A parotid abscess is best drained by horizontal incision, Hilton's method
 - ◆ During surgical removal, the parotid gland is removed in two parts in order to preserve the facial nerve. The plane of cleavage is defined by tracing the nerve from behind forwards
 - ◆ Mixed parotid tumor is a slowly growing lobulated painless tumor without any involvement of the facial nerve
5. (c) **Transverse sinus** (Ref: B.D.C 4th ed vol III - pg 10)
- ◆ The anterior part of the floor of the temporal fossa is crossed by an H- shaped suture
 - ◆ In this area four bones meet :-
 - (1) Frontal
 - (2) Parietal
 - (3) Temporal
 - (4) Sphenoid
 - ◆ This area is called pterion
 - ◆ Deep to the pterion there lie :-
 - the middle meningeal vein
 - the anterior division of middle meningeal artery
 - Stem of the lateral sulcus of the brain (sylvian fissure) also called as sylvian point
- The pterion corresponds to the site of the anterolateral (Sphenoidal) fontanelle on the neonatal skull, which disappears about three months after birth.
6. (a) **I molar upper**
(Ref: Gray's 39th/e, pg 591)
- The maxillary first molar has a cusp at each corner of its occlusive surface and the mesiopalatal cusp is connected to the distobuccal by an oblique ridge. A smaller cusplet or tubercle (cusplet of carabelli) usually appears on the mesiopalatal cusp, most commonly in Caucasian races.
7. (d) **Conservative** (Ref: B.D.C 4th ed vol III - pg 48)
- ◆ The subgaleal aponeurotic has loose areolar tissue which is known as the dangerous area of the scalp because the emissary veins, which open here may transmit infection from the scalp to the cranial venous sinuses.
 - ◆ So subgaleal hematoma should be treated conservatively because any procedure can lead to contamination

- ◆ Collection of blood in the layer of loose connective tissue causes generalised swelling of scalp. The blood may extend anteriorly into the root of the nose & into the eyelids causing black eye.
- 8. (a) **Stellate ganglion** (Ref: B.D.C 4th ed vol III - pg 191,192)
 - ◆ Inferior cervical ganglion is formed by the fusion of 7th & 8th cervical ganglia
 - ◆ It is often fused with the first thoracic ganglion and is then known as the cervicothoracic ganglion
 - ◆ It is also called the stellate ganglion because it is star shaped
 - ◆ Situated between the transverse process of C7 vertebra and the neck of the first rib
 - ◆ The head and the neck are supplied by the sympathetic nerves arising from the upper four thoracic segments of the spinal cord. Most of these preganglionic fibres pass through the stellate ganglion to relay in superior cervical ganglion.
 - ◆ Injury to the cervical sympathetic trunk produces Horner's syndrome
 - ◆ Horner's syndrome can also be produced by a lesion within the central nervous system anywhere at or above the first thoracic segment of the spinal cord involving the sympathetic fibres.
- 9. (b) **As far as possible** (Ref: B.D.C 4th ed vol III - pg 171)
 - ◆ Removal of the thyroid (thyroidectomy) with true capsule may be necessary in hyperthyroidism (thyrotoxicosis)
 - ◆ In partial thyroidectomy:
 - Posterior parts of both lobes are left behind. This avoids the risk of simultaneous removal of the parathyroids and also of post operative myxoedema (due to deficiency of thyroid hormones)
 - ◆ During operation:
 - Superior thyroid Artery ligated near the gland to save the external laryngeal nerve
 - Inferior thyroid artery is ligated away from the gland to save the recurrent laryngeal nerve
- 10. (b) **Area drained by angular facial vein**
(Ref: B.D.C 4th ed vol III - pg 59)
 - ◆ The facial vein is the largest vein of the face
 - ◆ It begins as the angular facial vein at the medial angle of the eye
 - ◆ It is formed by the union of supratrochlear and supraorbital veins
 - ◆ The angular vein continues as the facial vein
 - ◆ The facial vein communicates with the cavernous sinus through these connections
 - ◆ Infections from the face can spread in a retrograde direction and cause thrombosis of the cavernous sinus
 - ◆ This is specially likely to occur in presence of infection in the upper

16 Anatomy

lip and in the lower part of nose, cheek (especially near the medial canthus; *Gray's Anatomy 39th/e, pg 1280*)

- ◆ This area is, therefore called the dangerous area of the face

11. (c) At the same level as cricoid cartilage

(Ref: *Gray's 39th/e pg 444, 445*)

C₁ - Dens, level of nasopharynx

C₂ - Level of oropharynx and dependant soft palate with the mouth open

C₃ - Level of body of hyoid and its greater cornu

C₃₋₄ Junction - Level of upper border of thyroid cartilage and bifurcation of common carotid artery

C₄₋₅ - Level of thyroid cartilage

C₆ - Level of cricoid cartilage

The transverse process of the sixth cervical vertebra is prominent called **chassignac's tubercle**, and the common carotid artery may be compressed here.

12. (a) Thalassemia

(Ref: *Harrison's 16th/e pg 598*)

B-thalassemia syndromes :-

- ◆ Massive bone marrow expansion deranges growth and development
- ◆ Children develop characteristic chipmunk facies due to marrow hyperplasia and Frontal bossing
- ◆ Thinning and pathological fracture of long bones and vertebrae due to cortical invasion by the erythroid elements

13. (a) Geniculate ganglion (Ref: *B.D.C 4th ed vol III - pg 141,236*)

The facial nerve gives the following branches within the facial canal

(1) Greater petrosal nerve

(2) Nerve to stapedius

(3) The chorda tympani

The pterygopalatine ganglion :

- ◆ The motor or parasympathetic root of the ganglion is formed by the nerve of pterygoid canal

- ◆ It carries pre-ganglionic fibres that arise from neurons present near superior salivatory nucleus and lacrimal nuclei and pass through

↓

Nervus intermedius

↓

the facial nerve

↓

geniculate ganglion

↓

the greater petrosal nerve
 ↓
 N.of pterygoid canal
 ↓
 relay in P. ganglion
 ↓
 Post ganglionic fibres → secretomotor fibres in the lacrimal gland

14. (a) 6th month

(Ref : Gray's Anatomy 39th/e, pg 679)

- ◆ The tubotympanic recess at first lies inferolateral to the cartilaginous otic capsule, but as the capsule enlarges the spatial relationship alters and the tympanic cavity becomes anterolateral
- ◆ A cartilaginous process develops from the lateral part of the capsule to form the tegmen tympani and it curves caudally to form the lateral wall of pharyngotympanic tube. In this way, the tympanic cavity and the proximal part of the pharyngotympanic tube become included in the petrous region of the temporal bone.
- ◆ During the sixth or the seventh month the mastoid antrum appears as a dorsal expansion of the tympanic cavity

15. (b) Vesalius

(c) **Ovale** (Ref: B.D.C 4th ed vol III - pg 15, 95)

The cavernous sinus drains into :-

(a) Transverse sinus :

Through the superior petrosal sinus

(b) Internal jugular vein :

Through the inferior petrosal sinus and through a plexus around internal carotid artery

(c) Pterygoid plexus of veins :

Through the emissary veins passing through the foramen ovale, the foramen lacerum, the emissary sphenoidal foramen (foramen of vesalius)

Foramen of vesalius - situated between the foramen ovale and the scaphoid fossa, internally it opens between the foramen ovale and foramen rotundum.

(d) Facial vein :

Through superior ophthalmic vein

(e) The right and left cavernous sinuses communicate with each other through anterior and posterior intercavernous sinuses and through the basilar plexus of veins

◆ All these communications are valveless and blood can flow through them in either direction

Factors helping expulsion of blood from the cavernous sinus :

(a) Expansile pulsation of the internal carotid artery within the sinus

18 Anatomy

(b) Gravity

(c) Position of the head

In fact the phenomenon called pulsating exophthalmos is because of the close proximity of the cavernous sinus to internal carotid artery which may result in a carotico cavernous fistula due to head injury.

16. (d) Brachio cephalic (Ref: B.D.C 4th ed vol III - pg 180)

Brachiocephalic vein

- ◆ Right brachiocephalic is 2.5cm; left Brachio cephalic vein is 6 cm
- ◆ Each vein is formed behind the sterno clavicular joint, by the union of the internal jugular vein and the subclavian vein
- ◆ The two brachiocephalic veins unite at the lower border of the right first costal cartilage to form the superior vena cava
- ◆ The tributaries corresponds to the branches of the first part of subclavian artery

◆ Right brachiocephalic

- (1) Vertebral
- (2) Internal thoracic
- (3) Inferior thyroid
- (4) First posterior intercostal

◆ Left brachiocephalic

- (1) Vertebral
- (2) Internal thoracic
- (3) Inferior thyroid
- (4) First posterior intercostal
- (5) Left superior intercostal
- (6) Thymic and pericardial veins

17. (a) 2nd - 4th (Ref: B.D.C 4th ed vol III - pg 166)

Thyroid gland :-

Situation and extent

- ◆ The gland lies against vertebrae C5, C6, C7 and T1 and embracing the upper part of trachea
- ◆ Each lobe extends from the middle of the thyroid cartilage to the 4th or 5th tracheal ring
- ◆ The isthmus extends from the second to the 4th tracheal ring

Dimensions and weight

- ◆ Each lobe measures 5cm x 2.5cm x 2.5cm and the isthmus 1.2cm x 1.2cm
- ◆ On an average the gland weighs about 25g
- ◆ Larger in females than in males
- ◆ Further increases in size during menstruation and pregnancy

Capsules

True capsule - of connective tissue of gland. False capsule is derived from the pretracheal layer of deep cervical fascia, thick on the inner

surface of gland where it forms a suspensory ligament of Berry, which connects the gland to cricoid cartilage

- ◆ To avoid hemorrhage during operations the thyroid is removed along with true capsule

Lymphatic drainage :

upper part of gland → either directly to upper deep cervical nodes or through prelaryngeal nodes

lower part of gland → lower deep cervical nodes directly (or) through pretracheal and paratracheal nodes

18. (d) None of the above (Ref: B.D.C 4th ed vol III - pg 244, 246)

- ◆ All intrinsic muscles of the larynx are supplied by the recurrent laryngeal nerve except, for the cricothyroid muscle which is supplied by the external laryngeal nerve

- ◆ Cricothyroid is the only muscle on the external aspect of larynx

◆ Muscles acting on the larynx :

Movement

- (1) Elevation of larynx → Thyrohyoid, mylohyoid
- (2) Depression of larynx → Sternothyroid; sternohyoid
- (3) Opening inlet of larynx → Thyroepiglotticus
- (4) Closing inlet of larynx → Aryepiglotticus
- (5) Abductor of vocal cords → Posterior cricoarytenoid only
- (6) Adductor of vocal cords → Lateral cricoarytenoid, transverse, oblique arytenoids
- (7) Tensor of vocal cords → Cricothyroid
- (8) Relaxer of vocal cords → Thyroarytenoid

(Pg 246):-

- ◆ The internal laryngeal nerve supplies the mucous membrane up to the level of the vocal folds
- ◆ The recurrent laryngeal nerve supplies the mucous membrane below the vocal folds

Intrinsic muscles of larynx : (AD - Adductor; AB - Abductor)

- (1) Cricothyroid AD Tense the vocal cords
- (2) Posterior cricoarytenoid AB
- (3) Lateral cricoarytenoid AD
- (4) Transverse arytenoid(unpaired) AB
- (5) Oblique arytenoid & aryepiglotticus close the inlet of larynx
- (6) Thyroarytenoid AD Relaxes vocal cords & thyroepiglottic open the inlet of larynx

Vocalis muscle is made of some fibres of thyroarytenoids that gain attachment to the vocal ligament, relaxes vocal cords

19. (d) Sternohyoid (Ref: B.D.C 4th ed vol III - pg 130 fig 8.13).

Ansa cervicalis :

- ◆ This is a thin nerve loop that lies embedded in the anterior wall of

20 Anatomy

- the carotid sheath over the lower part of the larynx
- ♦ It is formed by:-
 - A superior root; and
 - An inferior root
- ♦ Superior root is the continuation of descending branch of hypoglossal nerve.
 - The fibres are derived from the first cervical nerve (C1)
 - This root descends over internal carotid, and common carotid artery
- ♦ The inferior root / descending cervical nerve is derived from C2 and C3 cervical spinal nerves
 - As this root descends, it winds round the internal jugular vein, continues antero-inferiorly to join the superior root in front of common carotid A.
- ♦ Superior root (C1) supplies
 - Superior belly of omohyoid
- Ansa cervicalis supplies
 - Sternohyoid
 - Sternothyroid
 - Inferior belly of omohyoid

The thyrohyoid and geniohyoid are supplied by separate branches from the first cervical nerve through the hypoglossal nerve.

20. (a) The opening of the auditory tube is located in the lateral wall of the nasopharynx
(b) The soft palate is at the level of separation of the nasopharynx and the oropharynx
(c) The pharynx is continuous with the oesophagus at the level of the sixth cervical vertebra
(Ref: 216 for a, 215 for b & c John Patten 2nd/e Neurological differential diagnosis)

Pharynx

The pharynx is continuous with the oesophagus at the level of sixth cervical vertebra (C6) corresponding to lower border of cricoid cartilage

Nerve supply:

Its mucous membrane is supplied by the pharyngeal branch of pterygopalatine ganglion suspended by maxillary branch of trigeminal nerve

- ♦ The other parts of the pharynx are supplied by cranial nerves IX and X

Nasopharynx

- ♦ Upper part of pharynx situated behind the nose and above the lower border of the soft palate
- ♦ Under the mucous membrane opposite the basiocciput, there is a collection of lymphoid tissue called the pharyngeal /

Nasopharyngeal tonsils, which is better developed in children and small or absent in adults. A pathologically enlarged pharyngeal tonsil is given the name adenoids. Its presence makes nasal breathing impossible and gives rise to adenoid facies

The lateral wall

The pharyngeal opening of the auditory tube, is at the level of the inferior nasal concha and 1.2cm behind it

John patten : 2nd Edition :-

There is no such thing as a 'ninth nerve palsy'. From a practical point of view the nerve is purely sensory and the sensory fibres terminate in the spinal tract of the trigeminal nerve when they enter the brain stem. The peripheral distribution is via the pharyngeal branches to the mucous membrane of the pharynx.

- ◆ The only muscle supplied by the nerve (IX) is the stylopharyngeus, which cannot be tested clinically

The error noted above is made because of the almost universal misconception of students, that the ninth nerve is motor to the palate. When the gag reflex is tested the sensory stimulus is relayed via the ninth nerve, but the resulting visible palatal movement is mediated by the tenth nerve.

This reflex is too gross for accurate clinical diagnosis of a glossopharyngeal nerve lesion.

21. (d) 6

(Ref: Gray's Anatomy 39th/e pg 541)

- ◆ Hyoid bone develops from cartilages of the second and third pharyngeal arches
- ◆ Second - lesser cornua
- ◆ Third - greater cornua
- ◆ Body - from the fused ventral ends of both
- ◆ Chondrification begins in the fifth foetal weeks in these elements
- Completed in 3rd and 4th months
- ◆ Ossification proceeds from 6 centres
- a pair for the body (2)
- one for each cornu (4) -
- ◆ Ossification begins in :-
(a) Greater cornua towards the end of intrauterine life
(b) In the body shortly before (or) after birth
(c) In lesser cornua around puberty
- ◆ The greater cornual apices remain cartilaginous until the third decade and epiphyses may occur here. They fuse with the body
- ◆ Synovial joints between the greater and lesser cornua may be obliterated by ossification in later decades

22. (a) The left brachiocephalic vein passes anterior to the brachiocephalic artery

22 Anatomy

(c) The left recurrent laryngeal nerve passes under the arch of aorta

(Ref : 261 for c, 259 for d, Gray's A 39/e - pg 1028 for a)

The brachiocephalic (innominate) artery, the largest branch of the aortic arch is 4-5cm in length

Relations of Brachiocephalic artery:

- ◆ Sternohyoid and sternothyroid
- ◆ The remains of the thymus
- ◆ Left brachiocephalic and right inferior thyroid veins crossing its root, and
- ◆ Sometimes the right cardiac branches of vagus, all separate the brachiocephalic artery from the manubrium
- ◆ Posterior are trachea below, right pleura above
- ◆ The right vagus is posterolateral before passing lateral to the trachea
- ◆ Right lateral are the right brachiocephalic vein, the upper part of superior vena cava & pleura
- ◆ Left lateral
 - the thymic remains
 - Origin of left common carotid artery
 - Inferior thyroid veins
 - the trachea

Thyroid IMA artery :-

Small inconstant artery which may arise from Brachiocephalic artery to supply thyroid isthmus. It may arise from :-

- (1) Aorta
- (2) Right common carotid artery
- (3) Subclavian
- (4) Internal thoracic artery

Ductus arteriosus, ligamentum arteriosum and patent ductus arteriosus

- ◆ During fetal life, the ductus arteriosus is a short wide channel connecting the beginning of the left pulmonary artery with the arch of aorta immediately distal to the origin of the left subclavian artery
- ◆ It conducts most of the blood from the right ventricle into the aorta, thus short-circuiting the lungs
- ◆ After birth it is closed functionally within about a week and anatomically within about 8 weeks
- ◆ The remnants of the ductus form a fibrous band called the ligamentum arteriosum
- ◆ The left recurrent laryngeal nerve hooks around the ligamentum arteriosum

Grays' A 39/e - pg 985

- ◆ At the level of the fifth thoracic vertebral body, the thoracic duct gradually inclines to the left, enters the superior mediastinum and

- then ascends to the thoracic inlet along the left border of the esophagus
- ◆ In this part of its course it is first crossed anteriorly by the aortic arch and then it runs posteriorly to the initial segment of the left subclavian artery (also see fig 19.3 in BDC vol I / 4th ed pg 259)

23. (b) Branch of internal carotid artery

(Ref: B.D.C 4th ed vol III - pg 218 for 'a', 56-57 for 'b' & 'c', 163 for 'd')

Arterial supply of palatine tonsil

- ◆ Main source - Tonsillar branch of facial artery
- ◆ Additional sources - Ascending palatine branch of facial artery
 - Dorsal lingual branches of lingual artery
 - Ascending pharyngeal branch of external carotid artery
 - Greater palatine branch of maxillary artery

Facial artery is the chief artery of the face and it is a branch of the external carotid artery, given off in the carotid triangle just above the level of the tip of greater cornua of hyoid bone.

Branches :-

The anterior branches on the face are large and named :

- (1) Inferior labial, to the lower lip
- (2) Superior labial to upper lip & antero inferior part of the nasal septum
- (3) Lateral nasal : to the ala & dorsum of nose

Submandibular ganglion :

Connection & branches :-

- (1) Motor or parasympathetic fibres pass from



Superior salivatory nucleus



Facial nerve



Chorda tympani



Lingual nerve (Posterior root) Sublingual & anterior lingual glands



Ganglion (Relay) → Lingual N (anterior root)



Submandibular gland



- (2) The sympathetic fibres are derived from plexus around the facial artery

- Contain post-ganglionic fibres arising in the superior cervical ganglion

- They pass through submandibular ganglion without relay

- (3) Sensory fibres reach the ganglion through lingual nerve

24 Anatomy

24. (c) Anaesthesia of larynx

(Ref: B.D.C 4th ed vol III - pg 247)

- ♦ When any foreign body enters the larynx, severe protective cough is expected to expel it
- ♦ Damage to the internal laryngeal nerve produces anaesthesia of the mucous membrane in the supraglottic part of larynx, breaking the reflex arc so that foreign bodies can readily enter it
- ♦ External laryngeal N → Weakness of phonation, loss of tightening effect of the cricothyroid on vocal cord
- ♦ Both recurrent laryngeal N. damage :
 - Vocal cords in cadaveric position
 - Phonation completely lost
 - Breathing difficult, through partially opened glottis
- ♦ One recurrent laryngeal N damage
 - Opposite vocal cord compensates
 - Hoarseness of voice
 - Failure of forceful explosive part of voluntary coughing
- ♦ Semon's law :-
 - In progressive lesions of recurrent laryngeal N
 - Posterior cricoarytenoids (the only abductors of the vocal cords) are the first to be paralysed and last to recover, as compared to adductors
 - In functional paralysis of the larynx the adductors are the first to be paralysed

25. (d) Vertebral artery

(Ref: B.D.C 4th ed vol III - pg 202)

Vertebral artery :-

It arises from the posterosuperior aspect of the first part of the subclavian artery near its commencement

IInd part :-

IInd part runs through foramina transversaria of the upper six cervical vertebrae

Relations - Posterior :- Ventral rami of C2 to C6, artery accompanied by a venous plexus and large branch from the stellate ganglion

Development of the vertebral artery :

- | | |
|------------------------|--|
| I st part | → From a branch of the dorsal division of 7th cervical intersegmental artery |
| II nd part | → From post-costal anastomosis |
| III rd part | → From spinal branch of the first cervical intersegmental artery |
| IV th part | → From preneural branch of first cervical intersegmental artery |

26. (c) 4th branchial pouch
(Ref: B.D.C 4th ed vol III - pg 171)
- ◆ The superior parathyroids (2) are also referred to as parathyroid IV because they develop from the 4th pharyngeal pouch
 - ◆ The inferior parathyroids are similarly called parathyroid III because they develop from third pouch
 - ◆ Superior parathyroid usually lies at the middle of the posterior border of thyroid gland and is usually dorsal to the recurrent laryngeal nerve.
 - ◆ Inferior parathyroid have a more variable position but they usually lie ventral to recurrent laryngeal nerve.
27. (a) Superior semicircular canal
(Ref: B.D.C 4th ed vol III - pg 22)
- The anterior surface of the petrous temporal bone presents the following features :-
- (a) The trigeminal impression - near apex - behind foramen lacerum - lodges trigeminal ganglion
 - (b) The hiatus & groove for greater petrosal nerve - lateral to trigeminal impression - leads to foramen lacerum / canaliculus innominate
 - (c) Arcuate eminence - still more laterally- produced by superior semicircular canal
 - (d) Tegmen tympani - anterolateral to arcuate eminence - sloping roof for tympanic cavity and the canal for tensor tympani
28. (c) C3,C4,C5
(Ref: B.D.C 4th ed vol III - pg 194)
- ◆ Phrenic nerve is a mixed nerve carrying motor fibres to the diaphragm and sensory fibres from the diaphragm, pleura and part of peritoneum
 - ◆ Phrenic nerve arises, chiefly from the fourth cervical nerve (C4), receives contributions from the third (C3) and (C5) nerves also.
 - ◆ The contribution from the C5 may come directly from the root or indirectly through the nerve to subclavius, in which case it is known as the accessory phrenic nerve
 - ◆ The phrenic nerve is the sole motor nerve supply to the diaphragm. Before the advent of modern treatments for pulmonary tuberculosis the operation of 'phrenic crush' used to be done to produce paralysis of the corresponding half of the diaphragm for a few weeks to give rest to the diseased lung.
 - ◆ The accessory phrenic nerve may occasionally arise from spinal nerves C4 or C6 or from the ansa cervicalis

26 Anatomy

29. (c) Internal jugular

(Ref: B.D.C 4th ed vol III - pg 170)

Venous drainage of thyroid gland :-

- (1) Superior thyroid vein → Internal jugular vein (or) Common facial vein
- (2) Middle thyroid vein → Internal jugular vein
- (3) Inferior thyroid veins → Emerge at the lower border of isthmus, form a plexus in front of the trachea and drain into the left brachiocephalic vein
- (4) The fourth thyroid vein (of vacher) → May emerge between the middle and inferior vein and drain into the Internal jugular vein

30. (c) Intracerebral

(Ref: B.D.C 4th ed vol III - pg 103)

- ♦ The internal carotid artery begins in the neck as one of the terminal branches of the common carotid artery at the level of the upper border of the thyroid cartilage
- ♦ Its course is divided into following four parts :-
 - (1) Cervical part - In the neck lies within the carotid sheath. This part gives no branches
 - (2) Petrous part - Within the petrous part of temporal bone in the carotid canal
 - (3) Cavernous part - Within the cavernous sinus, this part of the artery gives off :-
 - (a) Cavernous branches to the trigeminal ganglion
 - (b) The superior and inferior hypophyseal branches to the hypophysis cerebri
 - (4) Cerebral part - At the base of the brain after emerging from the cavernous sinus.
It gives off the following arteries :
 - (a) Ophthalmic
 - (b) Anterior cerebral
 - (c) Middle cerebral
 - (d) Posterior communicating
 - (e) Anterior choroidal
- ♦ The curvatures of the petrous, cavernous & cerebral parts of the ICA together form an 'S' shaped fig. the carotid siphon of angiogram

31. (a) Emissary vein

(b) Mandibular nerve

(Ref: B.D.C 4th ed vol III - pg 17)

STRUCTURES PASSING THROUGH FORAMINA ARE :

FORAMEN

(1) Incisive foramen

STRUCTURES

- (a) Greater palatine vessels
(terminal parts from palate to nose)

- (2) Greater palatine foramen
 (3) Lesser palatine foramen
 (4) Palatovaginal canal
 (5) Vomerovaginal canal
 (if patent)
- (6) FORAMEN OVALE
- (7) Foramen spinosum (M3)
 (a vein, artery & nerve)
- (8) Carotid canal
- (9) Foramen lacerum
- (b) Nasopalatine nerve
 (terminal part from nose to palate)
- (a) Greater palatine vessels
 (b) Anterior palatine nerve
- (a) Middle palatine nerve
 (b) Posterior palatine nerve
- (a) A pharyngeal branch from pterygopalatine ganglion
 (b) A small pharyngeal branch of the maxillary artery
- (a) Branches of the pharyngeal nerve from pterygopalatine ganglion & vessels
- M - Mandibular nerve
 A - Accessory meningeal artery
 L - Lesser petrosal nerve
 E - Emissary vein connecting the cavernous sinus with the pterygoid plexus of veins.
 Occasionally the anterior trunk of the middle meningeal vein.
- M - Middle meningeal artery
 M - the meningeal branch of mandibular nerve (nervus spinosus)
 M - the posterior trunk of middle meningeal vein
- Internal carotid artery
 Venous and sympathetic plexus around the artery
- During life - lower part filled with cartilage
 No significant structures passes through except - Meningeal branch of ascending pharyngeal artery & an emissary vein from the cavernous sinus
- Upper part
 - Traversed by Internal carotid

(10) Petrotympanic fissure

artery with its venous & sympathetic plexus

- Anterior part :- the greater petrosal nerve unites with deep petrosal nerve to form the nerve of pterygoid canal.

→ the medial end transmits the chorda tympani nerve and anterior tympanic artery.

→ Through wider posterior part :-

(a) Lowest part of medulla oblongata

(b) Three meninges

Through the subarachnoid space :-

S (a) Spinal accessory nerves

Vs (b) Vertebral arteries

(c) Sympathetic plexus around the vertebral arteries

Ps (d) Posterior spinal arteries

As (e) Anterior spinal artery
Through the narrow anterior part :-

(a) Apical ligament of dens

(b) Vertical band of cruciate ligament

(c) Membrana tectoria

(a) Hypoglossal nerve

(b) Meningeal branch of ascending pharyngeal artery

(c) Emissary vein connecting the sigmoid sinus with the suboccipital venous plexus.

(12) The hypoglossal / or anterior condylar canal

→ Through the anterior part :-

(a) Inferior petrosal sinus

(b) Meningeal branch of ascending pharyngeal artery

Through the middle part :-

(a) IXth, Xth, XIth cranial nerves

(13) Jugular foramen

Through the posterior part :-

- (a) Internal jugular vein
(b) Meningeal branch of occipital artery
- (14) The mastoid canaliculus → Transmits - the auricular branch of vagus
In the lateral wall of jugular fossa → emerges at the tympanomastoid fissure
- nerve is extracranial at birth but becomes surrounded by bone as tympanic plate and mastoid process develop.
- (15) The tympanic canaliculus → tympanic branch of the glossopharyngeal nerve
(on the partition between the jugular fossa & carotid canal)
- (16) Styломастoid foramen → (a) facial nerve
→ (b) Styломастoid branch of the posterior auricular artery
32. (d) Apex of orbit between optic nerve & lateral rectus
(Ref: B.D.C 4th ed vol III - pg 114, 23)
◆ Ciliary ganglion is a peripheral parasympathetic ganglion placed in the course of the oculomotor nerve
◆ It lies near the apex of the orbit between the optic nerve & tendon of the lateral rectus muscle

Connections of parasympathetic ganglia:

Ganglia	Sensory Root	Sympathetic Root	Secretomotor Root	Motor Root	Distribution
(1) Ciliary	From Nasociliary nerve	Plexus along ophthalmic artery		Edinger-Westphal nucleus ↓ Oculomotor nerve ↓ Nerve to inferior oblique	(1) Ciliaris muscles (2) Sphincter pupillae
(2) Otic	Branch from auriculotemporal nerve	Plexus along middle meningeal artery	Inferior salivatory nucleus ↓ glossopharyngeal nerve ↓ tympanic branch ↓ tympanic plexus ↓ Lesser petrosal nerve		(i) Secretomotor to parotid gland via auriculo-temporal nerve (ii) Tensor veli palatini & tensor tympani via nerve to medial pterygoid (unrelayed)

33. (c) Has sensory innervation from vagus
 (Ref: B.D.C 4th ed vol III - pg 217-218)
- ◆ The tonsil is almond shaped
 - ◆ Two surfaces - lateral & medial
 - ◆ The lateral surface is covered by a sheet of fascia which forms the capsule of the tonsil
 - ◆ The capsule is an extension of pharyngobasilar fascia
 - ◆ It is only loosely attached to the muscular wall of pharynx formed here by the superior constrictor & by the styloglossus
 - ◆ Anteroinferiorly the capsule is firmly adherent to the side of the tongue just in front of the insertion of the palatoglossus & palatopharyngeal muscles

Lymphatic drainage - ((Ref: B.D.C 4th ed vol III - pg 195-196)

- ◆ Jugulo digastric nodes is the main node draining the tonsil
- ◆ The entire lymph from the head & neck drains ultimately into the deep cervical nodes

Nerve supply : - Glossopharyngeal & lesser palatine nerves

Development : - The epithelium over the tonsil develops from the ventral part of the second pharyngeal pouch.
 The lymphocytes are mesodermal in origin

34. (d) Temporalis (Ref: B.D.C 4th ed vol III - pg 152)

Actions of the mandible

(1) Depression → Mainly → Lateral pterygoid

Accessory M → digastric, when the mouth is open wide or geniohyoid, open wide or mylohyoid against resistance

During contraction the lateral pterygoid rotates the head of mandible and opens the mouth.

During opening it pulls the articular disc forwards

(2) Elevation → Masseter

Temporalis

The medial pterygoid muscles of both sides

(3) Protrusion → By the lateral and medial pterygoid muscles

(4) Retraction → Posterior fibres of temporalis. It may be resisted by the middle & deep fibres of the masseter, the digastric and geniohyoid muscles.

(4) Lateral / side to → eg : turning chin to left

side movements - left lateral pterygoid

- right medial pterygoid

turning chin to right

- Right lateral pterygoid

- Left medial pterygoid

(1) Dislocation of mandible :

- During excessive opening of mouth; as during a convulsion, the head of the mandible of one or both sides may slip anteriorly into the infratemporal fossa, as a result of which there is inability to close the mouth.
- Reduction is done by depressing the jaw with the thumbs placed on the last molar teeth, and at the same time elevating the chin.

(2) Derangement of articular disc gives rise to clicking and pain during movements of jaw

(3) Seventh (VII - facial) nerve should be preserved in operation on the joint

35. (b) Venous commitants of facial artery**(c) Palatine vein**

(Ref : Grays A 39th/e pg 624, 625)

This deep, lateral aspect (of palatine tonsils) is covered by a layer of fibrous tissue, the tonsillar hemicapsule, separable with ease for most of its extent from the underlying muscular walls of the pharynx which is formed here by the superior constrictor, with styloglossus on its lateral side.

- ◆ Anteroinferiorly the hemicapsule adheres to the side of the tongue and to palatoglossus & palatopharyngeus.
- ◆ In this region, the tonsillar artery, a branch of the facial, pierces the superior constrictor to enter the tonsil, accompanied by venae comitantes → pg 625 → and may hemorrhage if this fold (palatoglossal fold) is damaged during surgery.
- ◆ An important and sometimes large vein, the external palatine (or) paratonsillar vein, descends from the soft palate lateral to the tonsillar hemicapsule before piercing the pharyngeal wall. Hemorrhage from this vessel from the upper angle of the tonsillar fossa may complicate tonsillectomy.

(BDC Vol III / 4th/e pg 219)

- ◆ Tonsillectomy is usually done by the guillotine method
- ◆ Hemorrhage after tonsillectomy is checked by removal of clot from the raw tonsillar bed
- ◆ This is to be compared with the method for checking post partum hemorrhage from the uterus
- ◆ These are the only two organs in the body where bleeding is checked by removal of clots
- ◆ In other parts of the body, clot formation is encouraged
- ◆ Suppuration in the peritonsillar area is called quinsy. It is drained by making an incision in the most prominent point of the abscess.

36. (d) Zygomatic nerve

(Ref: BDC Vol III, 4th/e pg 28)

The infra orbital fissure transmits :

- (a) The zygomatic nerve
- (b) The orbital branches of pterygopalatine ganglion
- (c) The infraorbital nerve
- (d) The infraorbital vessels
- (e) The communication between the inferior ophthalmic vein and the pterygoid plexus of veins

37. (c) Posterior to iris

(Ref: B.D.C 4th ed vol III - pg 275, 276)

- ◆ The lens is a transparent biconvex structure which is placed between the anterior and posterior segments of the eye.
- ◆ Aqueous humor is a clear fluid, which fills the space between the cornea in front and the lens behind the anterior segment, which is divided by the iris into anterior and posterior chambers.
- ◆ Aqueous humor secreted into posterior chamber from the capillaries in the ciliary processes → anterior chamber through the pupil → anterior ciliary veins through the space of the iridocorneal angle (located between the fibres of the ligamentum pectinatum and the canal of schlemm).
- ◆ The lens is circular in outline measuring 1cm in diameter. It contributes to 15 diopters to the total of 58 diopters power of the eye.

38. (d) Root of iris

(Ref: B.D.C 4th ed vol III - pg 274)

The anterior surface of iris	→ Covered by a single layer of mesothelium
The posterior surface of iris	→ double layer of deeply pigmented cells, continuous with those on ciliary body
The main bulk of iris.	→ Stroma - made of blood vessels - loose connective tissue containing pigment cells

- ◆ The long posterior and anterior ciliary arteries join to form the major arterial circle at the periphery of the iris.
- ◆ From this circle vessels converge towards the free margin of iris and join together to form the minor arterial circle of the iris.
- ◆ The colour of the iris is determined by the number of pigment cells in its connective tissue. If the pigment cells are absent, the iris is blue in colour due to diffusion of light in front of the black posterior surface.

34 Anatomy

39. (a) Nucleus tractus solitarius

(Ref: B.D.C 4th ed vol III - pg 335 Table 25.1)

Cranial nerve	Nuclei	Location	Function of the nerve component
(1) VIII (Facial N)	1. Motor nucleus	Lower pons	Facial expression, elevation of hyoid
	2. Nucleus of tractus solitarius	Lower pons	Taste, ant. two thirds tongue
	3. Superior salivatory nucleus	Lower pons	Secretomotor, submandibular and sublingual salivary gland
	4. Lacrimal N	Lower pons	Secretomotor, lacrimal gland, nasal etc. proprioceptive
(2) IX (Glossopharyngeal N)	1. Nucleus Ambiguous	Medulla	Elevation of larynx Secretomotor to parotid gland
	2. Inferior salivatory nucleus	Medulla	Taste posterior 1/3 of tongue, sensations from mucous membrane of Pharynx and post 1/3 of tongue go to dorsal n. of vagus (GVA) & spinal n. of 5th (N), (GSA)
	3. Nucleus of tractus solitarius	Medulla	Movements of palate, pharynx and larynx Motor & secretomotor to bronchial tree & gut, inhibitory to heart.
(3) X (vagus) & cranial part of XI	1. Nucleus ambiguus	Medulla	Sensations from viscera. Taste from post. most tongue & epiglottis.
	2. Dorsal n. of vagus	Medulla	sensations from the skin of external ear go to spinal nucleus of V nerve (GSA)
	3. Nucleus of tractus solitarius		

* GVA - General visceral afferent

* GSA - General somatic afferent

40. (d) Hyaloid artery

(Ref: Gray's A 39th/e pg 721,722)

During development

- ♦ The posterior part of the capsule is supplied by branches from the hyaloid artery, and the anterior part is supplied by branches from the anterior ciliary arteries.
- During the 4th month → hyaloid artery gives off retinal branches
- By the 6th month → all of the vessels have atrophied except the hyaloid artery
- By the 8th month → hyaloid artery is atrophied although its proximal

- part persists as central retinal artery
- ♦ The anteroventral surface of the vesicle and distal part of the stalk are also infolded, forming a wide groove - the choroid fissure - through which mesenchyme extends with an associated artery - the hyaloid artery
- ♦ Failure of the optic fissure to close is a rare anomaly that is always accompanied by a corresponding deficiency in the choroid & iris (congenital coloboma)

41. (a) Enamel

(Ref.: BDC III / 4th/e pg 208, 209 fig 14.1)

Deciduous teeth are 20 in number

Permanent teeth are 32

Each tooth has three parts :-

1. A crown - projecting above (or) below the gum
2. A root - embedded in jaw beneath the gum
3. A neck - between the crown & root

Structurally each tooth is composed of :

1. Pulp in the centre
2. The dentine surrounding the pulp
3. The enamel covering the projecting part of dentine
4. The cementum surrounding the embedded part of dentine
5. The periodontal membrane

- ♦ The enamel is the hardest substance in the body. It is made up of crystalline prisms lying roughly at right angles to the surface of the tooth.
- ♦ The periodontal membrane (ligament) holds the root in its socket, acts as periosteum to both the cementum as well as the bony socket

42. (b) Straight sinus

(Ref.: BDC III / 4th/e pg 96, 97)

(Gray's A 39th/e pg 1553, Eponyms)

- ♦ Galen's nerve (ansa galeni) - branch of superior laryngeal nerve to the recurrent laryngeal nerve.
- ♦ (deep galenic venous system) vein - great cerebral vein
- ♦ Claudius galen (130-200 A.D)
- ♦ The inferior sagittal sinus, a small channel lies in the posterior two thirds of the lower, concave free margin of the falx cerebri
- ♦ It ends by joining the great cerebral vein to form the straight sinus
- ♦ At the termination of the great cerebral vein into the sinus, there exists a ball valve mechanism, formed by a sinusoidal plexus of blood vessels, which regulates the secretion of C.S.F.

Thrombosis of the superior sagittal sinus may be caused by spread of infection from the nose, scalp and diploe.

This gives rise to

36 Anatomy

- (a) Rise in Intracranial tension
- (b) Delirium and sometimes convulsions due to congestion of the superior cerebral veins
- (c) Paraplegia of the upper motor neuron type due to bilateral involvement of the paracentral lobules of the cerebrum where the lower limbs and perineum are represented

43. (a) Rhomboid fossa forms floor

Ref : III / 341, 342 fig 27.1, 27.2

Floor of 4th ventricle : Pg 342

It is also called the rhomboid fossa because it is rhomboidal shape.

It is formed by - (a) The posterior surface of the pons and

(b) The posterior surface of the open part of medulla

44. (a) Thymus

(Ref : BDC III / 4th/e pg172)

- ◆ Thymus is situated in the anterior and superior mediastina of thorax extending above into lower part of neck
- ◆ It is well developed at birth, grows till puberty, thereafter gradually atrophies and is replaced by fat.
- ◆ Bilobed structures - lobes are unequal in size
- ◆ Each lobe developed from Endoderm of third pharyngeal pouch
- ◆ Weighs - 10-15g at birth
 - 30-40g at puberty
 - 10g after mid - adult life
- ◆ Blood supply - Internal thoracic arteries
 - Inferior thyroid arteries

Veins → Left brachiocephalic

Internal thoracic veins

Inferior thyroid veins

- ◆ Nerve supply → Vasomotor supply - stellate ganglion; capsule - phrenic nerve, descendens cervicalis

Functions :

(1) Lymphopoiesis

(2) Control development of the peripheral lymphoid tissue during neonatal period

(3) The cortical lymphocytes of thymus → from stem cells of bone marrow origin

95% of the lymphocytes - T lymphocytes

-are alloallergic ('self' antigens)

-are short lived (3-5 days)

-never move out of organ

-are destroyed within the thymus by phagocytes

-Their remnants are seen in Hassall's corpuscles

5% of the lymphocytes

-are long lived (3months or more)

- move out to join circulating lymphocytes
- All immunologically competent but are not committed (from lymph nodes & spleen - are committed)
- (4) Medullary epithelial cells secrete
 - (a) Lymphopoietin
 - (b) Competence Inducing factor
- (5) Normally there are no germinal centres in cortex. They appear in autoimmune diseases.

45. (b) Optic

(Ref : BDC III / 4th/e pg 25, 26)

The three parts of the superior orbital fissure transmit the following structures

(1) Lateral part

- (a) Lacrimal nerve
- (b) Frontal nerve
- (c) Trochlear nerve
- (d) Superior ophthalmic vein
- (e) Meningeal branch of lacrimal artery
- (f) Anastomotic branch of middle meningeal artery (anastomoses with recurrent branch of the lacrimal artery)

(2) Middle part

- (a) Upper & lower divisions of oculomotor nerve
- (b) Nasociliary nerve in between the two divisions of the oculomotor
- (c) The abducent nerve

(3) Medial part

- (a) Inferior ophthalmic vein
- (b) Sympathetic nerves from the plexus around internal carotid artery.

The optic canal transmits the optic nerve and the ophthalmic artery.

The optic canal lies posteriorly, at the junction of the roof and medial wall.

46. (c) 130°

(Ref : Gray's A 39th/e pg 489)

- ♦ The cranio - base angle is of special interest and represents the orientation of the anterior cranial base relative to the posterior cranial base
- ♦ The cranial base angle can be measured in many ways.
- ♦ The most common measurement, the angle between the chord from the sella to the foramen caecum relative to the chord between the sella and basion; has an average value in humans of about 135°. Which it attains by flexion 2years after birth.(In the fig 27.34 C, sella - stands for the centre of cavity meant for pituitary gland & basion is the median point on anterior rim of foramen magnum,

38 Anatomy

chord stands for linear measure or simply a line). Foramen caecum → A depression between the crista galli and the crest of the frontal bone is crossed by the fronto-ethmoidal suture and bears the foramen caecum, which is usually a small blind ended depression but which occasionally accommodates a vein draining from nasal mucosa to superior sagittal sinus

- ◆ It is anterior to cribriform plate in median plane
- ◆ The cranial base angle is an important determinant of craniofacial form because it influences the position of the face relative to the neurocranium, the protrusion of the mandible relative to the maxilla & the shape of the pharynx.

47. (c) Cartilaginous part of auditory tube

(Ref : BDC III / 4th/e pg 15)

- ◆ The sulcus tubae is the groove between the posteromedial margin of the greater wing of sphenoid and the petrous temporal bone
- ◆ It lodges the cartilaginous part of the auditory tube
- ◆ Posteriorly the groove leads to the bony part of auditory tube, which lies within the petrous temporal bone

(Gray's A 39/e - pg 470)

- ◆ The irregular inferior surface (of the petrous part) forms the exterior of the cranial base. Near the apex of the petrous part, there is a quadrilateral area which is partly associated with the attachment of levator veli palatini and the cartilaginous pharyngotympanic tube.

48. (b) It is discontinuous with cricothyroid membrane

(Ref : Gray's A 39th/e pg 637, 642)

- ◆ It's (Thyroarytenoid's) lower and deeper fibres form a band which, in a coronal section, appears as a triangular bundle, and is attached to the lateral surface of the vocal process and to the inferior impression on the anterolateral surface of the arytenoid cartilage. This bundle, is vocalis muscle, is parallel with, and just lateral to the vocal ligament.

◆ CRICOHYROID LIGAMENT :

It is composed mainly of elastic tissue

It consists of 2 parts

- Anterior part : Anterior median cricothyroid ligament
- Lateral part : - Cricovocal membrane
- ◆ The upper edge of the cricovocal membrane is free, horizontally aligned and thickened to form the vocal ligament
- ◆ The cricovocal membrane is covered internally by mucosa and externally by lateral cricoarytenoid & thyroarytenoid
- ◆ The laryngeal epithelium is mainly a ciliated, pseudo stratified respiratory epithelium where it covers the inner aspects of the

larynx including the posterior surface of the epiglottis.

- ◆ However the vocal cords are covered by non-keratinized, stratified squamous epithelium, an important variation which protects the tissue from the effects of the considerable mechanical stresses acting on the surfaces of the vocal cords.

49. (c) Trigeminal N

(Ref : BDC III / 4th/e pg 94)

Structures in the lateral wall of the sinus, from above Downwards :-

- (a) Oculomotor N
- (b) Trochlear N
- (c) Ophthalmic N
- (d) Maxillary N
- (e) Trigeminal ganglion

Structures outside the sinus :-

Superior (1) Optic tract

- (2) Optic chiasma
- (3) Olfactory tract
- (4) Internal carotid artery
- (5) Anterior perforated substance

Inferior (1) Foramen lacerum

- (2) Junction of body & greater wing of sphenoid

Medially (1) Hypophysis cerebri

- (2) Sphenoidal air sinus

Laterally (1) Temporal lobe with uncus

Anteriorly : Superior orbital fissure & apex of orbit

Posteriorly : (1) Apex of petrous temporal bone

- (2) Crus cerebri of the midbrain

Structures passing through the centre of sinus :-

- (a) Internal carotid artery with venous & sympathetic plexus around it
- (b) Abducent nerve

50. (c) Trigeminal

(Ref : BDC III / 4th/e pg 100)

- ◆ The trigeminal ganglion lies on the trigeminal impression, on the anterior surface of the petrous temporal bone near its apex
- ◆ It occupies a special space of dura mater, called the trigeminal or Meckel's cave
- ◆ There are two layers of dura below the ganglion
- ◆ The cave is lined by pia - arachnoid, so that the ganglion along with the motor root of the trigeminal nerve is surrounded by C.S.F
- ◆ The ganglion lies at a depth of about 5cm from the preauricular point

51. (d) Soft palate ; (Ref : BDC III / 4th/e pg 186)

Accessory Nerve (XI)

40 Anatomy

- ◆ Cranial root → accessory to vagus & is distributed through the branches of the latter
- ◆ Spinal root
- ◆ Both are special visceral efferent
- ◆ Cranial root :
 - arises from the lower part of nucleus ambiguus
 - It is distributed through branches of vagus to the muscles of palate, pharynx, the larynx & possibly the heart
 - The cranial root fuses with the vagus just below its inferior ganglion
 - In the jugular foramen, the cranial root unites for a short distance with the spinal root, and again separates from it as it passes out of the foramen.
- ◆ Spinal root
 - It arises from a long spinal nucleus situated in the lateral part of the anterior grey column of spinal cord extending between segments C1 to C5. Its fibres supply sternocleidomastoid and trapezius muscles.

52. (c) Glossopharyngeal Nerve

(Ref: B.D.C 4th ed vol III - pg 218, Gray's A 39th/e pg 625)

"The palatine tonsil region receives its nerve supply through tonsillary branches of maxillary nerve and glossopharyngeal nerve"

- ◆ The maxillary nerve fibres pass through, but do not synapse in, the pterygopalatine ganglion and are distributed through lesser palatine nerves
- ◆ The latter together with the tonsillary branches of the glossopharyngeal nerve, forms a plexus around the tonsil, nerve fibres from this plexus are also distributed to the soft palate and region of the oropharyngeal isthmus.
- ◆ The tympanic branch of glossopharyngeal N supplies the mucous membrane of the tympanic cavity and is therefore responsible for the referred pain in infections of the tonsils

53. (b) Stenson's duct opens opposite upper second molar teeth

(Ref: B.D.C 4th ed vol III - pg 136, 137 & 161)

(Eponyms - Gray's A 39th/e pg 1557, 1556)

- ◆ Wharton's duct - duct of submandibular salivary gland
Thomas Wharton (1616? - 1673), physician, St. Thomas' Hospital, London, U.K. Remained on duty there during the great plague of 1665.
- ◆ Stenson's duct - the parotid duct
Niels stenson (1638 - 1686)
Professor of Anatomy Copenhagen, Denmark, Demonstrated the parotid duct at the age of 23.

(Ref: B.D.C 4th ed vol III - pg 137)

- ◆ The parotid duct (Stenson's) runs forwards for a short distance between the buccinator and the oral mucosa. Finally, the duct turns medially and opens into the vestibule of the mouth (gingivo - buccal vestibule) opposite the crown of the upper second molar tooth.

(Ref: B.D.C 4th ed vol III - pg 161)

- ◆ The submandibular ducts (Wharton's) opens on the floor of the mouth, on the summit of the sublingual papilla, at the side of the frenulum of the tongue.
- ◆ The parotid gland is ectodermal in origin. It develops from the buccal epithelium just lateral to the angle of mouth. The outgrowth branches repeatedly to form the duct system and acini.

54. (d) Is a derivative of the second P.A

(Ref: B.D.C 4th ed vol III - pg 221,223-224 for 'd')

- ◆ The origins of the constrictors are situated anteriorly in relation to the posterior opening of the nose, the mouth and the larynx.
- ◆ From here the fibres pass into the lateral and posterior walls of the pharynx, the fibres of the two sides meeting in the middle line in a fibrous raphe
- ◆ The three constrictors are so arranged that the inferior overlaps the middle which inturn overlaps the superior
- ◆ The lymph from the pharynx drains into the retropharyngeal and deep cervical nodes

Mesodermal derivatives of pharyngeal arches (Pg 29) (1.4 table)

55. (a) Deviation of tongue to right

(Ref : Gray's A 39th/e pg 585, 587)

Muscles of the tongue :-

- ◆ The tongue is divided by a median fibrous septum, attached to the body of the hyoid bone
- ◆ Each half has extrinsic & intrinsic muscles

Extrinsic muscles

- ◆ Genioglossus -
- ◆ Hyoglossus -Depresses the tongue } Hypoglossal nerve
- ◆ Styloglossus- Draws the tongue upwards & backwards }
- ◆ Chondroglossus
- ◆ Palatoglossus - cranial part of accessory nerve - elevates the root of tongue & approximates the palatoglossal arch to its contralateral fellow, thus shutting off the oral cavity

They bring about movements of the tongue bodily

Intrinsic muscles :-

- ◆ They change the shape of tongue
- ◆ All are innervated by hypoglossal nerve

42 Anatomy

- ◆ Superior longitudinal → } Shorten the tongue
- ◆ Inferior longitudinal → }
- ◆ Transverse → narrow & elongates
- ◆ Vertical → flatter & wider

Genioglossus :-

Brings about the forward traction of tongue to protrude its apex from the mouth. Acting bilaterally, the two muscles depress the central part of the tongue, making it concave from side to side. Acting unilaterally, the tongue diverges to the opposite side.

56. (d) Posterior auricular nodes

(Ref : BDC III / 4th/e pg 216-217 fig 14.9)

- ◆ In relation to the oropharyngeal isthmus, there are several aggregations of lymphoid tissue that constitute the waldeyer's ring
- ◆ The most important aggregations are the right and left palatine tonsils usually referred to simply as the tonsils
- ◆ Posteriorly and above → pharyngeal tonsil
- ◆ Laterally and above → tubal tonsils
- ◆ Inferiorly → lingual tonsil over the posterior part of the dorsum of the tongue

57. (d) Greater superficial petrosal nerve

(Ref : BDC III / 4th/e pg139)

Branches and Distribution of facial nerve

A. Within the facial canal

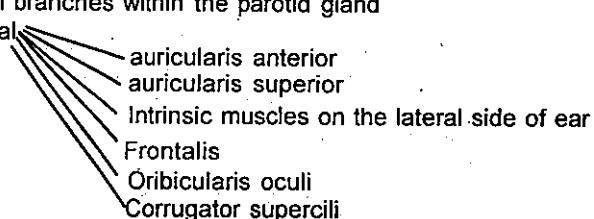
- (1) Greater petrosal nerve
- (2) Nerve to stapedius (hyperacusis in paralysis)
- (3) Chorda tympani

B. At its exit form stylomastoid foramen

- (1) Posterior auricular 
- (2) Digastric - Posterior belly of digastric
- (3) Stylohyoid

C. Terminal branches within the parotid gland

- (1) Temporal



- (2) Zygomatic - orbicularis oculi
- (3) Buccal
- (4) Marginal] muscles of lower lip & chin
- (5) Mandibular]
- (6) Cervical - platysma .
- D. Communicating branches with adjacent cranial & spinal nerves

58. (b) Sympathetic + greater petrosal nerve

(Ref : BDC III / 4th/e pg103)

- ◆ The greater petrosal nerve carries gustatory and parasympathetic fibres
- ◆ It arises from the geniculate ganglion of the facial nerve → enters middle cranial fossa → through hiatus for the greater petrosal nerve on the anterior surface of the petrous temporal bone → foramen lacerum → joins deep petrosal nerve which carries sympathetic fibres to form the nerve of the pterygoid canal.
- ◆ The nerve of pterygoid canal passes through the pterygoid canal to reach the pterygopalatine ganglion
- ◆ The parasympathetic fibres relay in this ganglion
- ◆ The post ganglionic parasympathetic supply lacrimal gland & mucosal glands of nose, palate & pharynx
- ◆ The gustatory or taste fibres are not relayed & are distributed to the palate
- ◆ The deep petrosal nerve, sympathetic in nature is a branch of sympathetic plexus around the internal carotid artery and contains post ganglionic fibres from superior cervical ganglion
- ◆ The lesser petrosal nerve - parasympathetic → branch of tympanic plexus - preganglionic parasympathetic fibres from the tympanic branch of glossopharyngeal nerve → passes out of skull through foramen ovale → ends in otic ganglion → post - ganglionic fibres → through auriculotemporal nerve → supply parotid gland.
- ◆ External petrosal nerve → sympathetic → inconstant branch → from plexus around middle meningeal artery → geniculate ganglion of the facial nerve

59. (a) Cruciate ligament

(Ref : Gray's A 39th/e pg 760,761)

- ◆ The transverse atlantal ligament is a broad, strong band which arches across the atlantal ring behind the dens, its length varies about a mean of 20mm
- ◆ It is attached laterally - prominent tubercle on the medial side of each atlantal lateral mass, and broadens medially where it is covered anteriorly by a thin layer of articular cartilage.
- ◆ It consists almost entirely of collagen fibres, which, in the central part of the ligament, cross one another at an angle to form an interlacing mesh.

44 Anatomy

- ◆ From its upper margin a strong median longitudinal band arises which inserts into the basilar part of the occipital bone between the apical ligament of the dens and membrana tectoria, and from its inferior surface a weaker and less consistent longitudinal band passes to the posterior surface of the axis
- ◆ These transverse and longitudinal components together constitute the cruciform ligament
- ◆ The transverse ligament divides the ring of atlas into unequal parts
 - The posterior 2/3rd surrounds the spinal cord meninges
 - The anterior 1/3rd contains the dens, which it retains in position even when all other ligaments are divided

60. (c) Lingual Nerve

(Ref : BDC III / 4th/e pg 155)

- ◆ Lingual Nerve is one of the two terminal branches of the posterior division of the **mandibular nerve**
- ◆ Sensory to anterior 2/3rd of tongue & floor of mouth
- ◆ However - chorda tympani - branch off facial - is gustatory & to Ant 2/3rd of tongue - and secretomotor to sublingual & submandibular glands
- ◆ And these fibres are also distributed via lingual nerve
- ◆ Lingual nerve begins 1cm below the skull
 - first runs between tensor veli palatini & lateral pterygoid
 - then runs between lateral & medial pterygoids
 - 2cm below skull it is joined by chorda tympani nerve
 - At the lower lateral pterygoid it runs downwards & forwards between ramus of mandible and medial pterygoid
 - Next it lies in direct contact with mandible, **medial to the third molar tooth** between the origins of the superior constrictors & the mylohyoid muscles
 - Soon leaves the gums & runs over hyoglossus deep to mylohyoid
 - Finally it lies on the surface of genioglossus (still) deep to mylohyoid
 - It winds around the submandibular duct & divides into its terminal branches.

61. (a) Maxillary nerve

(b) Mandibular nerve

(Ref : BDC III / 4th/e pg 92)

- ◆ The Dura of the vault has only a few sensory nerves which are derived mostly from the ophthalmic division of trigeminal nerve
- ◆ The dura of the floor has a rich nerve supply & is quite sensitive to pain :-
 - (a) Anterior cranial fossa - Supplied mostly by - Anterior ethmoidal nerve; partly by - Maxillary nerve
 - (b) Middle cranial fossa - Anterior half - Maxillary nerve; Posterior

- half - Trigeminal ganglion and - Mandibular nerve
 (c) Posterior cranial fossa - Recurrent branches from the C1, C2, C3 cervical spinal nerves and partly by meningeal branches of the ninth and tenth cranial nerves (IX & X)

62. (a) 6 months

(Ref : Gray's A 39th/e pg 484)

- ◆ The sphenoidal and posterior fontanelles 'fill in' - within 2-3 months of birth
- ◆ Mastoid fontanelles - end of first year (12months)
- ◆ Anterior fontanelles - middle of 2 years (18months)
- ◆ At birth vault is unilaminar
- ◆ Tables and intervening diploë appear - 4th year; with maximal differentiation - 35years. When diploic veins are prominent in radiograms.
- ◆ The mastoid process is a visible bulge in 2nd year - invaded by air cells in the sixth (6th year).

63. (b) Four

(Ref : BDC III / 4th/e pg 335 table 25.1)

Trigeminal nerve is the V th cranial nerve

Cranial N	Nuclei (n)	Location	Function of N. component
V	1. Motor n.	Upper pons	Movement of mandible
	2. Mesencephalic n.	Midbrain	Proprioceptive, muscles of mastication, face & eye
	3. Superior sensory n.	Upper pons	Touch & Pressure from skin & mucous membrane of facial region (sensory)
	4. Spinal n.	From upper pons to C2 segment of spinal cord	Pain & temperature of face (sensory)

64. (b) Hypophysis cerebri

(Ref : BDC III / 4th/e pg 99)

"Arterial supply of Hypophysis cerebri" :-

The hypophysis cerebri is supplied by the following branches of Internal carotid artery

(1) One superior hypophyseal artery on each side

(a) The ventral part of hypothalamus

(b) Upper part of infundibulum

(c) Lower part of the infundibulum, through trabecular artery

46 Anatomy

(2) One inferior hypophyseal artery on each side

Each divides into medial & lateral branches, which join one another to form an arterial ring around the posterior lobe.

Branches from this ring supply:

- ◆ Posterior lobe
- ◆ Also anastomose with branches from superior hypophyseal artery
- ◆ The anterior lobe / pars distalis is supplied exclusively by portal vessels arising from capillary tufts formed by superior hypophyseal arteries. The long portal vessels drain the median eminence & the upper infundibulum, and the short portal vessels drain the lower infundibulum. The portal vessels are of great functional importance because they carry the hormone releasing factors from the hypothalamus to the anterior lobe where they control the secretory cycles of different glandular cells.

65. (d) Alar ligament

(Ref : BDC III / 4th/e pg 150)

Temporomandibular joint :-

- ◆ It is a synovial joint of condylar variety

(A) Articular surfaces :-

(1) Upper articular surface -

- (a) Articular eminence
- (b) Anterior part of the mandibular fossa

(2) Inferior articular surface - head of mandible. the articular disc represents the primitive degenerated insertion of lateral pterygoid

- Articular surfaces are covered by fibrocartilage
- The joint cavity divided into upper & lower parts by an intra-articular disc. **Upper compartment** → permit gliding movements / **lower compartment** → permit gliding & rotatory movements

(B) Ligaments

The ligaments are the

- (1) Fibrous capsule
- (2) Lateral ligament
- (3) The sphenomandibular ligament
- (4) The stylomandibular ligament

Relations of Temporomandibular joint :-

(A) Lateral

- (1) Skin & fasciae
- (2) Parotid gland
- (3) Temporal branches of facial nerve

(B) Medial

- (1) Tympanic plate separating the joint from internal carotid artery
- (2) Spine of sphenoid - with upper end of sphenomandibular ligament attached to it

- (3) Auriculotemporal & chorda tympani nerves
 - (4) Middle meningeal artery
 - (C) Anterior
 - (1) Lateral pterygoid
 - (2) Masseteric nerve & vessels
 - (D) Posterior
 - (1) Parotid gland separating it from external auditory meatus
 - (2) Superficial temporal vessels
 - (3) Auriculotemporal nerve
 - (E) Superior
 - (a) Middle cranial fossa
 - (b) Middle meningeal vessels
 - (F) Inferior - Maxillary artery & vein
- Blood supply :-
- ◆ From superficial temporal & maxillary artery
 - ◆ Veins follow arteries
- Nerve supply :-
- ◆ Auriculotemporal nerve
 - ◆ Masseteric nerve

66. (a) Two carotids

(Ref : Logan Turner 10th/e - pg 404-405)

Anomalies of 2nd branchial groove :-

Second groove anomalies are by far the commonest

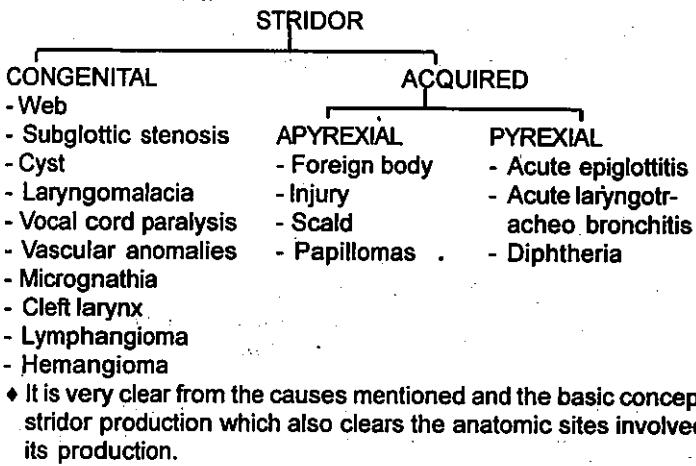
- (1) Branchial cyst : Remnants of first branchial cleft may open on to
 - (1) Lateral wall of pharynx on the palatopharyngeal fold
 - (2) In the floor of external auditory meatus at the junction of cartilaginous & bony part
 - (3) Usually - at the ant. border of sternomastoid at the junction of middle & upper third. It is removed through an incision along the anterior border of sternomastoid muscle
- (2) Branchial sinus : Sinus from the second branchial groove
 - Presents as a small opening along the anterior border of the sternomastoid muscle
 - May discharge mucoid material
 - Treatment - surgical removal of the sinus & tract after filling the tract with a dye such as methylene blue. The tract often runs close to the bifurcation of the common carotid artery.
- (3) Branchial fistula :
 - The inferior opening of the fistula is again commonly along the anterior border of the sternomastoid
 - It runs superiorly and medially between the external and internal carotid arteries, lateral to the hypoglossal nerve to open into the pharynx in the area of tonsillar fossa
 - These can be demonstrated radiographically by the

injection of radiopaque dye and treatment is by surgical excision

67. (a) Larynx; (b) Bronchus; (d) Trachea

(Ref : *Logan tumer 10th/e pg 382*)

- ◆ The most common feature of laryngeal disorder in infants or children is stridor, with (or) without hoarseness
- ◆ Stridor is voice produced by an obstruction to the passage of air in and out of the lower respiratory tract
- ◆ Laryngeal stridor is usually inspiratory
- ◆ Bronchial stridor is usually expiratory
- ◆ A rare inspiratory & expiratory variety - Abdominal vessel arising from arch of Aorta

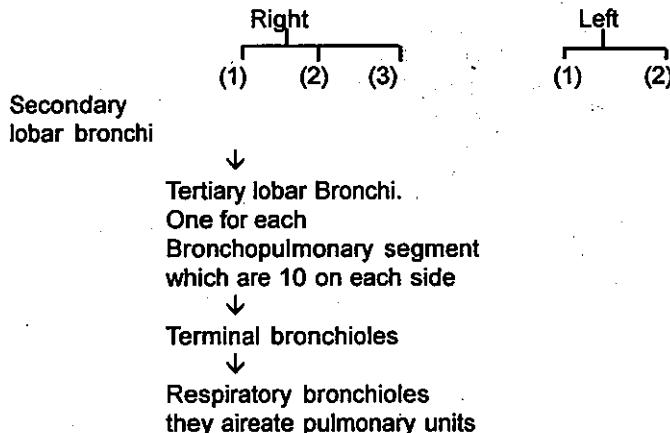


68. (d) The sensory supply of trachea is by the vagus

(Ref : *BDC II / 4th/e pg 265, 228*)

- ◆ The trachea is 10 to 15 cm in length
- ◆ Its external diameter - 2cm in males
- 1.5cm in females
- ◆ The lumen is smaller than in cadavers
 - 3 mm - 1 year of age
 - Corresponds to age in years during childhood
 - Maximum 12mm - in adults
- ◆ The upper end of trachea lies at the lower border of the cricoid cartilage - opposite C6 vertebra
- ◆ In the cadaver - bifurcated lower end at the lower border of T4 vertebra corresponding in front to sternal angle
- ◆ In the living subjects, in the erect posture, the bifurcation lies at the lower border of the (T6) sixth thoracic vertebra and descends still further during inspiration.

- ◆ The right principal bronchus is 2.5cm long. It is shorter, wider and more in line with the trachea than the left principal bronchus
- ◆ Inhaled particles, 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.
- ◆ The left principal bronchus is 5cm. It is longer, narrower and more oblique than the right bronchus.



- ◆ During swallowing when larynx is elevated, the trachea elongates by stretching because the tracheal bifurcation is not permitted by the arch of aorta. Any downward pull due to sudden and forced inspiration, or aortic aneurysm will produce the physical sign known as 'tracheal tug'.

◆ Relations of the thoracic part of trachea :

- Anteriorly

- (1) Manubrium sterni
- (2) Sternothyroid muscles
- (3) Remains of the thymus
- (4) The left brachiocephalic & left common carotid arteries
- (5) Deep cardiac plexus
- (6) Some lymph nodes

- Posteriorly

- (1) Oesophagus
- (2) Vertebral column

- On the right side :

- (1) Right lung and pleura
- (2) Right vagus
- (3) Azygos vein

- On the left side :

- (1) Arch of aorta
- (2) Left common carotid & left subclavian arteries

50 Anatomy

- ◆ (3) Left recurrent laryngeal nerve
- ◆ Arterial supply : Inferior thyroid arteries
- ◆ Nerve supply : Parasympathetic - Vagus & recurrent laryngeal N.
 - Sensory & secretomotor
 - Motor to trachialis
- Sympathetic - Middle cervical ganglion along the Inferior thyroid arteries

69. (b) It is situated deep in the sella
(c) The sphenoidal air cells lie inferior to it
(e) It is supplied by a branch of the internal carotid artery
(Ref : BDC III / 4th/e pg 99)
- ◆ The pituitary gland (Hypophysis cerebri) lies in the hypophyseal fossa or sella turcica or pituitary fossa.
 - ◆ The fossa is roofed by the diaphragma sellae. The stalk of the hypophysis cerebri pierces the diaphragma sellae and is attached above to the floor of the third ventricle

Relations :

Superiorly :

- (1) Diaphragma sellae
- (2) Optic chiasma
- (3) Tuber cinereum
- (4) Infundibular recess of third ventricle

Inferiorly :

- (1) Irregular venous channels between the two layers of dura mater lining the floor of the hypophyseal fossa
- (2) Hypophyseal fossa
- (3) Sphenoidal air sinuses

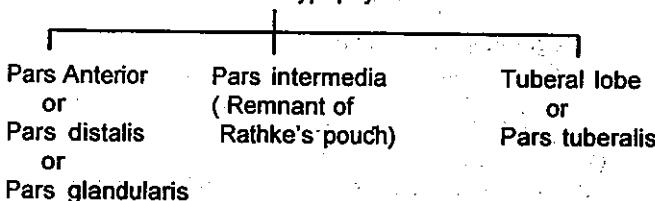
On each side : The cavernous sinus with its contents

◆ Sub divisions :

- (1) Adeno hypophysis
- (2) Neuro hypophysis

- (1) The adenohypophysis develops as an upward growth called the Rathke's pouch from the ectodermal roof of stomodeum
- (2) The neurohypophysis develops from as an downward growth from the floor of the diencephalon, and is connected to the hypothalamus by neural pathways

Adenohypophysis



Neurohypophysis

Posterior lobe (or) Neural lobe	Infundibular stem which contains the neural connections of the posterior lobe with hypothalamus	Median eminence of the tuber cinereum
--	--	--

- ◆ The hypophysis cerebri is supplied by the branches of the internal carotid artery

70. (b) Crest of maxilla

- (c) Septal cartilage
- (d) Perpendicular plate of ethmoid
- (e) Nasal bone

(Ref : Gray's A 39th/e pg 568)

Septal cartilage

- ◆ Almost quadrilateral in side view, the septal cartilage is sandwiched between two layers of mucoperichondrium and lies often eccentrically between the anterior parts of the nasal cavity
 - Its antero superior margin → above to the posterior border of internasal suture
 - The middle part of the antero superior margin - continuous with upper lateral cartilages
 - and the lowest part - is attached to these parts by perichondral extensions
 - The anteroinferior border is connected on each side with medial crurae of the major alar cartilage
 - The posterosuperior border joins the perpendicular plate of ethmoid
 - The posteroinferior border is attached to the vomer and the nasal crest and anterior nasal spine of the maxilla
 - The septal cartilage may extend back (especially in children) as a narrow sphenoidal process for some distance between the vomer and the perpendicular plate of ethmoid
 - The anteroinferior part of the nasal septum between the nares is devoid of cartilage and is called the membranous septum. It is continuous with the columella anteriorly.

71. (a) 100

(Ref : Gray's A 39th/e pg 75)

- (1) A normal young adult body contains - upto 450 lymphnodes
- (2) Head and neck - 60 - 70
- (3) Thorax - 100

52 Anatomy

(4) Abdomen and pelvis - 250

- ♦ Lymph nodes are particularly numerous in the neck, mediastinum, posterior abdominal wall, abdominal mesenteries pelvis and proximal regions of the limbs
- ♦ By far the greatest number lie close to the viscera, especially in the mesenteries

72. (b) Cricothyroid

(c) Cricoarytenoid

(Ref : BDC III / 4th/e pg 240)

Thyroid cartilage :

- ♦ It is V-shaped in cross - section, consisting of a right and a left laminae, each being roughly quadrilateral and they are placed obliquely relative to midline, their posterior borders being far apart and anterior borders approaching each other at an angle :
about 90° - male
about 120° - female
- ♦ The lower parts of anterior borders fuse in the midline to form the laryngeal prominence
- ♦ The posterior borders are free and they are prolonged upwards & downwards as superior & inferior cornua or horns
- ♦ The inferior border is convex in front & concave behind
- ♦ The outer surface of each lamina is marked by an oblique line which extends from the superior thyroid tubercle in front of the roof of the superior cornua to the inferior thyroid tubercle behind the middle of the inferior border.
- ♦ The thyrohyoid and inferior constrictor of the pharynx are attached to the oblique line.

73. (c) Lamina papyracea

(Ref : BDC III / 4th/e pg 230, 231)

Chonchae and meatuses :

The nasal conchae are curved bony projections directed downwards and medially, they are as follows

- (1) Inferior concha - independent bone
- (2) Middle concha - projection from medial surface of ethmoidal labyrinth
- (3) Superior concha - (smallest)

Meatuses are passages beneath the overhanging conchae :-

(1) Inferior meatus - Largest meatus

- Nasolacrimal duct opens at the anterior one third & posterior two - thirds
- Opening guarded by lacrimal fold or Hasner's valve

- (2) Middle meatus - A rounded bulge produced by underlying middle ethmoidal sinuses - Ethmoidal bulla
- A deep semicircular sulcus below the bulla - hiatus semilunaris
 - A short passage at the anterior end of the hiatus - infundibulum
 - Opening of
 - (a) Frontal air sinus (1) in number
 - (b) Maxillary air sinus (2) in numberpresent at the anterior & posterior parts of hiatus respectively
 - Opening of - Middle ethmoidal air sinus at upper margin of bulla
- (3) Superior meatus- Opening of the posterior ethmoidal air sinuses

The sphenoethmoidal recess is a triangular fossa just above the superior concha - receives opening of the sphenoidal air sinus.

Neuroanatomy

Questions

- 74. Vestibulocerebellar tract terminates in the ___ of cerebellum - (JIPMER 78, AMU 86)**
- a. Flocculus
 - b. Lingula
 - c. Nodulus
 - d. Uvula
 - e. All of the above
- 75. In the Grey matter of cerebellum are the following nuclei - (PGI 79, 81)**
- a. Nucleus globosus
 - b. Nucleus emboliformis
 - c. Nucleus dentatus
 - d. Nucleus fastigi
 - e. Nucleus caudatus
- 76. By three cerebellar peduncles, the cerebellum is attached to (DNB 80)**
- a. Spinal cord
 - b. Medulla
 - c. Cerebrum
 - d. Midbrain
 - e. Pons
- 77. CSF is partly absorbed by lymphatics around ___ cranial nerves - (PGI 80, ROHTAK 89)**
- a. I, II, VIII
 - b. I, II, VI, VII
 - c. I, III, VII, VIII
 - d. I, II, VI, VIII
- 78. Tremors associated with cerebellar lesions - (PGI 81,82)**
- a. Called resting tremor
 - b. Seen predominantly in extremities
 - c. Occurs ipsilateral to lesion
 - d. Has coarse, irregular quality
 - e. Occurs at rest and during sleep

79. Which nerve does not arise from the medulla - (AIIMS 82)
- a. Facial
 - b. Glossopharyngeal
 - c. Vagus
 - d. Hypoglossal
80. All are nuclei of the basal ganglia except - (AIIMS 84)
- a. Caudate nucleus
 - b. Amygdaloid nucleus
 - c. Lentiform nucleus
 - d. Dentate nucleus
81. In the adult, the spinal cord ends at the level of - (NIMHANS 87)
- a. L2
 - b. L3
 - c. L4
 - d. L5
82. Following are the branches of the basilar artery (PGI 88)
- a. Pontine
 - b. Posterior inferior cerebellar artery
 - c. Posterior cerebellar
 - d. Labyrinthine
83. Frontal eye motor area is (DNB 89)
- a. 9
 - b. 2
 - c. 6
 - d. 8
84. Broca's area is localised in - (AIIMS 89)
- a. Superior temporal gyrus
 - b. Parietal lobe
 - c. Inferior frontal lobe
 - d. Angular gyrus
85. Pupillary reflex pathway includes all except - (Kerala 89)
- a. Retina
 - b. Edinger westphal nucleus
 - c. Pretectal areas
 - d. Lateral geniculate body

56 Anatomy

- 86. Myelin sheath in CNS is synthesised by (AI 90)**
- a. Microglia
 - b. Schwann cell
 - c. Oligodendroglia
 - d. All
- 87. Which of the following is not a part of Epithalamus - (AP 91)**
- a. Pineal body
 - b. Posterior commissure
 - c. Trigonum Habenulae
 - d. Geniculate bodies
- 88. All the following arteries supply medulla oblongata except - (AIIMS 91)**
- a. Posterior inferior cerebellar artery
 - b. Spinal artery
 - c. Anterior inferior cerebellar artery
 - d. Vertebral artery
- 89. Which muscle is not found in the floor of the fourth ventricle - (JIPMER 92)**
- a. Abducent N
 - b. Dorsal vagal nuclei
 - c. Facial N
 - d. Hypoglossal N
- 90. Purkinje cells from the cerebellum end in - (JIPMER 92)**
- a. Extrapyramidal system
 - b. Cranial nerve nuclei
 - c. Cerebellar nuclei
 - d. Cerebral cortex
- 91. Fibres passing through posterior column is / are - (PGI 89)**
- a. Posterior spinocerebellar tract
 - b. Anterior spinocerebellar tract
 - c. Lateral spinothalamic tract
 - d. Fasciculus gracilis
- 92. About blood brain barrier following is true - (JIPMER 98)**
- a. Present only at choroid plexus
 - b. Restricts the entry of lipid soluble molecules
 - c. Destroyed by inflammation, irradiation & tumor
 - d. None

93. Fibres which pass through genu of internal capsule are - (PGI 97)
- Corticonuclear fibres
 - Rubral fibres
 - Fibres of upper limb
 - Fibres of lower limb
94. Lesions of the medial temporal lobe is associated with (PGI 98)
- Auditory agnosia
 - Agnosia
 - Visual amnesia
 - Alexia
95. Which of the following is / are the ventral posterior nucleus of thalamus - (PGI 03)
- Medial lemniscus
 - Lateral lemniscus
 - Cortico spinal
 - Spinothalamic
 - Trigeminal lemniscus
96. The mammillothalamic tract terminates in which one of the following nuclei in the thalamus - (UPSC 02)
- Anterior
 - Ventral lateral
 - Mediodorsal
 - Pulvinar
97. Which of the following thalamic nuclei does not project to neocortex - (AIIMS 03)
- Intralaminar
 - Reticular nuclei
 - Pulvinar nuclei
 - Anterior thalamic nuclei
98. Which of the following nuclei belongs to the general visceral efferent columns - (AIIMS 04)
- Facial nerve nucleus
 - Trigeminal motor nucleus
 - Dorsal nucleus of vagus
 - Nucleus ambiguus
99. Central sulcus is an example of - (JIPMER 03)
- Limiting sulcus
 - Axial sulcus
 - Operculated sulcus
 - Complete sulcus

Neuroanatomy

Answers

74. (a) Flocculus
(c) Nodulus
(d) Uvula

(Ref: Gray's A 39th/e pg 363)

VESTIBULOCEREBELLAR FIBRES

A) PRIMARY VESTIBULOCEREBELLAR MOSSY FIBRES:

- They are fibres of the vestibular branch of the vestibulocochlear nerve
- They enter the cerebellum with the ascending branch of the vestibular nerve, and pass through the superior vestibular nucleus & the juxtarestiform body
- They terminate, mainly ipsilaterally, in the granular layer of the nodule, caudal part of the uvula, ventral part of the anterior lobe and bottom of the deep fissures of the vermis

B) SECONDARY VESTIBULO CEREBELLAR MOSSY FIBRES :

- They arise from the superior vestibular nucleus & the caudal portions of the medial and inferior vestibular nuclei
- They terminate bilaterally not only in the same regions that receive primary vestibulo cerebellar fibres but also in the flocculus, which lacks a primary vestibulocerebellar projection
- Some of the mossy fibres from the medial & inferior vestibular nuclei are cholinergic.

75. (a) Nucleus globosus
(b) Nucleus emboliformis
(c) Nucleus dentatus
(d) Nucleus fastigi

(Ref: BDC Vol III, 4th/e pg 339)

Grey mater of cerebellum :

It consists of the cerebellar cortex and the cerebellar nuclei.

There are four pairs of nuclei :

- (1) The nucleus dentatus - neocerebellar
- (2) The nucleus globosus - paleocerebellar
- (3) The nucleus emboliformis
- (4) The nucleus fastigi - archicerebellar

76. (b) Medulla
 (d) Midbrain
 (e) Pons

(Ref : BDC Vol III, 4th/e pg 339)

Constituents of the cerebellar Peduncles :

Peduncle	Afferent tracts	Efferent tracts
A. Superior cerebellar peduncle	(1) Anterior spinocerebellar (2) Tectocerebellar (3) Dentato-olivary (4) Fastigioreticular	(1) Cerebellorubral (2) Dentothalamic
B. Middle cerebellar peduncle	Pontocerebellar (Part of the corticoponto-cerebellar pathway)	
C. Inferior cerebellar peduncle	(1) Posterior spinocerebellar (2) Cuneocerebellar (posterior arcuate fibres) (3) Olivocerebellar (4) Parolivocerebellar (5) Reticulo cerebellar (6) Vestibulo cerebellar (7) Anterior external arcuate fibres (8) Striae medullares (9) Trigemino cerebellar	(1) Cerebello vestibular (2) Cerebello olivary (3) Cerebello reticular

The fibres entering or leaving the cerebellum are grouped to form three peduncles which connect the cerebellum to the midbrain, the pons and the medulla.

77. (a) I, II & VIII

(Ref : BDC Vol III, 4th/e pg 306, 305)

Cerebrospinal fluid : (CSF)

- ◆ The C.S.F is a modified tissue fluid
- ◆ It is contained in the ventricular system of the brain and in the subarachnoid space around the brain and the spinal cord
- ◆ C.S.F replaces lymph in C.N.S

Formation :-

- ◆ Bulk - formed by choroid plexus of the lateral ventricles :
- ◆ Lesser - formed by plexuses of the third & fourth ventricles
- ◆ Possibly - also formed by the capillaries on the surface of the brain & spinal cord

Total quantity : 150ml

Rate of formation : 200ml/hr (or) 5000ml/day

Normal pressure of CSF is 60 to 100 mm of C.S.F (or of water)

Circulation

- Each lateral ventricle → Interventricular foramen → Third ventricle → Cerebral aqueduct → Fourth ventricle → Median and lateral apertures → Subarachnoid space.

Absorption :

- (1) C.S.F - Chiefly absorbed through the arachnoid villi and granulations, and is thus drained into the cranial venous sinuses.
- (2) Also - Partly absorbed by the perineurial lymphatics around the first, second and eighth cranial nerves
- (3) It is also absorbed by veins related to spinal nerves.
 - ♦ Obstruction in the vertebral canal produces Froin's syndrome (or) Iculation syndrome. This is characterised by yellowish discolouration of C.S.F (Xanthochromia) below the level of obstruction and its spontaneous coagulation after withdrawal due to high protein content. Biochemical examination of such fluid reveals that the protein content is raised, but the cell content is normal. This is known as albumino cytologic dissociation.

78. (b) Seen predominantly in extremities

- (c) Occurs ipsilateral to lesion
- (d) Has coarse, irregular quality

(Ref : BDC Vol III, 4th/e pg 340)

Functions of the cerebellum :

The cerebellum controls the same side of the body i.e its influence is ipsilateral

- (1) The cerebellum controls voluntary movements so that they are smooth, balanced and accurate, chiefly done in neocerebellum. Cerebellar dysfunction gives rise to incoordination of movements.
- (2) The cerebellum controls tone, posture and equilibrium. Chiefly done by archicerebellum and the paleo cerebellum. Cerebellar lesions, therefore, give rise to hypotonia and disturbance of equilibrium.
- ♦ Cerebellar syndrome : Cerebellar lesions give rise to symptoms and signs which together constitute the cerebellar syndrome. It is characterised by :
 - (i) Muscular hypotonia
 - (ii) Intension tremor (Finger - nose & heel - Knee test)
 - (iii) Adiadokokinesia - inability to perform rapid & regular alternating movements
 - (iv) Nystagmus
 - (v) Scanning speech
 - (vi) Ataxic gait

79. (a) Facial

(Ref : BDC Vol III, 4th/e pg 139, 184)

Facial Nerve :-

- ◆ The facial nerve is attached to the brainstem by two roots, motor and sensory
- ◆ The sensory root is also called nerves intermedium
- ◆ The two roots of the facial nerve are attached to the pons just medial to eighth cranial nerve

Vagus Nerve :-

- ◆ In the intracranial course the fibres run forwards and laterally through the reticular formation of the medulla, between the olivary nucleus and inferior cerebellar peduncle.
- ◆ The nerve is attached, by about ten rootlets to the posterolateral sulcus of the medulla

Hypoglossal N

- ◆ In their intraneuronal course, the fibres pass forwards lateral to the medial lemniscus and pyramidal tract and medial to the reticular formation and olivary nucleus.
- ◆ The nerve is attached to the anterolateral sulcus to the medulla, between the pyramid and the olive by 10 to 15 rootlets.

Glossopharyngeal Nerve :

- ◆ In their intraneuronal course, the fibres of the nerve pass forwards and laterally, between the olivary nucleus and the inferior cerebellar peduncle, through the reticular formation of the medulla.
- ◆ At the base of the brain, the nerve is attached by 3 to 4 filaments to the upper part of the posterolateral sulcus of the medulla, just above the rootlets of the vagus nerve.

(* Note the similarity between the course of X and IX cranial nerves)

80. (d) Dentate nucleus

(Ref : BDC Vol III, 4th/e pg 359)

The basal nuclei are subcortical, intracerebral masses of grey matter forming important parts of the extrapyramidal system. They include the following

(1) Corpus striatum -

- (a) Caudate nucleus
- (b) Lentiform nucleus

The two nuclei are interconnected by a few bands of grey matter below the anterior limb of the internal capsule. The bands give it a striped appearance, Hence the name.

(b) lentiform nucleus - lateral part - putamen

- medial part - globus pallidus
- Caudate nucleus
- Putamen } Striatum
- Globus pallidus - pallidum

62 Anatomy

- (2) The amygdaloid body forms a part of limbic system
- (3) Claustrum
 - The four nuclei i.e. caudate, lentiform, amygdaloid and claustrum are joined to the cortex at the anterior perforated substance.
 - ◆ The Dentate nucleus is a nucleus in the cerebellum

81. (a) Lower border of L1

(Ref : *Snell's Neuroanatomy 4th/e pg 6, BDC Vol III 4th/e pg 309*)

- ◆ The spinal cord is the lower elongated, cylindrical part of the C.N.S.
- ◆ It occupies the upper two thirds of the vertebral canal
- ◆ It extends from the level of the **upper border of the atlas to the lower border of the vertebra L1**, or the upper border of vertebra L2.
- ◆ In the young child it is relatively longer and ends at the **upper border of the third lumbar vertebra (L3)**
- ◆ It is about 45cm long
- ◆ The lower end is conical and is called the **conus medullaris**
- ◆ The apex of conus is continued down as **filum terminale**
- ◆ Along its length the cord presents two thickenings, the cervical and lumbar enlargements which give rise to the large nerves of the limbs
- ◆ The spinal cord gives off 31 pairs of spinal nerves
- ◆ As the spinal cord is much shorter than the vertebral column, the spinal segments do not lie opposite the corresponding vertebrae
- ◆ In estimating the position of a spinal segment in relation to the surface of the body, it is important to remember that **a vertebral spine is always lower than the corresponding spinal segment**
- ◆ In the cervical region there is a difference of one segment
- ◆ In upper thoracic region - difference of two segments
- ◆ In the lower thoracic region - difference of three segments

82. (a) Pontine

(d) Labrynthine

(Ref : *BDC Vol III, 4th/e pg 385*)

Basilar artery is formed by the union of the right and left vertebral arteries, at the lower border of the pons, and ends at its upper border by dividing into the right and left posterior cerebral arteries. It gives off the following branches.

- (1) Pontine
- (2) Labrynthine (end artery)
- (3) Anterior inferior cerebellar
- (4) Superior cerebellar
- (5) Posterior cerebral

83. (a) 9, (c) 6, (d)8

(Ref : *Snell's Neuro anatomy, 4th/e pg 282*)

The frontal eye field :

- ◆ It extends forwards from the facial area of the precentral gyrus into the middle frontal gyrus (parts of Brodmann's areas 6,8, and 9)
- ◆ Electrical stimulation of this region causes conjugate movements of the eyes, especially towards the opposite side
- ◆ The exact pathway taken by nerve fibres from this area is not known, but they are thought to pass to the superior colliculus of the mid-brain:
- ◆ The superior colliculus is connected to the nuclei of the extraocular muscles by the reticular formation
- ◆ The frontal eye field is considered to control voluntary scanning movements of the eye and is independent of visual stimuli
- ◆ The involuntary following of moving objects by the eye involves the visual area of the occipital cortex to which the frontal eye field is connected by association fibres.

84. (c) Inferior frontal lobe

(Ref : BDC Vol III, 4th/e pg 282)

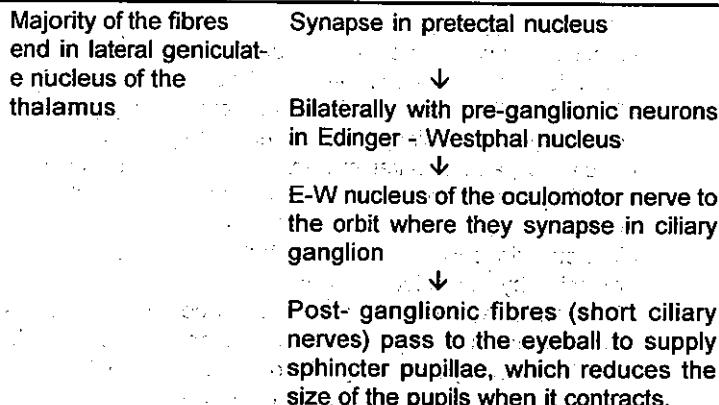
- ◆ The motor speech area of Broca is located in the inferior frontal gyrus between the anterior and ascending rami and the ascending and posterior rami of the lateral fissure (Brodmann's areas 44 and 45).
- ◆ In the majority of individuals, this area is important on the left or dominant hemisphere and ablation will result in paralysis of speech
- ◆ In those individuals in whom the right hemisphere is dominant, the area on the right side is of importance. The ablation of this region in the non-dominant hemisphere has no effect on speech.
- ◆ Broca's speech area brings about the formation of words by its connections with the adjacent primary motor areas, the muscles of the larynx, mouth, tongue, soft palate, and the respiratory muscles are appropriately stimulated.

85. (d) Lateral geniculate body

(Ref : Gray's A 39th/e pg 435)

Pupillary light reflex

- ◆ A light stimulus acting upon the retinal photoreceptors
- ↓
- Retinal ganglion cells activity
- ↓
- Axons of which form optic nerve
- ↓
- Optic chiasma
- ↓
- Optic tract → Small no. of fibres leave optic tract before it reaches thalamus
- ↓ ↓



86. (c) Oligodendroglia

(Ref: Snell's Neuro anatomy 4th/e pg 78)

Oligodendrocytes

- ◆ They have small cell bodies and a few delicate processes
- ◆ There are no filaments in their cytoplasm
- ◆ They are frequently found in rows along myelinated nerve fibres and surround nerve cell bodies
- ◆ Electron micrographs show the process of a single oligodendrocyte joining the myelin sheaths of several nerve fibres. However, only one process joins the myelin between two adjacent nodes of Ranvier.
- ◆ Oligodendrocytes are responsible for the formation of the myelin sheath of nerve fibres in the central nervous system, much as the myelin of peripheral nerves is formed from schwann cells.
- ◆ They can each form several internodal segments of myelin on the same or different axons
- ◆ A single oligodendrocyte can form as many as 60 internodal segments
- ◆ Unlike schwann cells, oligodendrocytes and their associated axons are not surrounded by basement membrane
- ◆ Myelination begins at about the sixteenth week of intrauterine life and continues post nataally until practically all the major nerve fibres are myelinated by the time the child is walking.
- ◆ Oligodendrocytes also surround nerve cell bodies (Satellite oligodendrocytes) and probably have a similar function to the satellite or capsular cells of peripheral sensory ganglia. They are thought to influence the biochemical environment of neurons.

87. (d) Geniculate bodies; (Ref : Snell's Neuro anatomy 4th/e pg 239)

Epithalamus

- ◆ The epithalamus consists of the habenular nuclei and their connections and the pineal gland

- ◆ The habenular nucleus is a small group of neurons situated just medial to the posterior surface of the thalamus
- ◆ Afferent fibres are received from the amygdaloid nucleus in the temporal lobe through the stria medullaris thalami, other fibres pass from the hippocampal formation through the fornix.
- ◆ Some of the fibres of the stria medullaris thalami cross the midline and reach the habenular nucleus of the opposite side, these latter fibres form the habenular commissure
- ◆ The Habenular nucleus is believed to be a centre for integration of olfactory, visceral, and somatic afferent pathways
- ◆ The pineal gland or body is a small, conical structure that is attached by the pineal stalk to the diencephalon
- ◆ It project backwards to lie posterior to midbrain
- ◆ The base of the pineal stalk possesses a recess that is continuous with the cavity of the third ventricle
- ◆ The superior part of the base of the stalk contains the habenular commissure, the inferior part of the base of the stalk contains the posterior commissure
- ◆ The pineal gland, once thought to be of little importance is now recognised as an endocrine gland capable of influencing the activities of the pituitary gland, the islets of Langerhans, the parathyroids, the adrenals and gonads
- ◆ Secretions reach via blood stream or through C.S.F
- ◆ Their actions are mainly inhibitory
- ◆ The gland has been found to be most active during darkness. Pineal gland, in animal experiments, exhibits a circadian rhythm that is influenced by light.
- ◆ Melatonin and serotonin are present in high concentrations within the pineal gland

88. (c) Anterior inferior cerebellar artery

(Ref : Snell's Neuroanatomy, 4th/e pg 186).

Blood supply of medulla oblongata :

"The vertebral, anterior and posterior spinal arteries, posterior inferior cerebellar and basilar arteries all send branches to the medulla oblongata"

Lateral medullary syndrome of Wallenberg :

- ◆ The lateral part of medulla oblongata is supplied by posterior inferior cerebellar artery, a branch of Vertebral artery
- ◆ Thrombosis of either of these arteries causes :
 - Dysphagia] paralysis of ipsilateral palatal and pharyngeal
 - Dysarthria] muscles (Nucleus ambiguus)
 - Analgesia] ipsilateral face - nucleus and spinal tract
 - Thermoanaesthesia] of trigeminal nerve
 - Vertigo] Vestibular nuclei
 - Nausea]
 - Vomiting]

- Nystagmus
- Ipsilateral Horner's syndrome (descending sympathetic fibres)
- Ipsilateral cerebellar signs - gait and limb ataxia (cerebellum or inferior cerebellar peduncle)
- Contralateral loss of sensation of pain and temperature - (Spinal lemniscus - Spinothalamic tract)

Medial medullary syndrome :

- ♦ The medial part of the medulla oblongata is supplied by the vertebral artery
- ♦ Thrombosis of the medullary branch produces the following signs and symptoms :
 - Contralateral hemiparesis - pyramidal tract
 - Contralateral impaired sensations of position and movement and tactile discrimination - medial lemniscus
 - Ipsilateral paralysis of tongue muscles - with deviation to the paralysed side when tongue is protruded (**hypoglossal nerve**)

89. (c) Facial N

(Ref : BDC Vol III, 4th/e pg 342)

Floor of the fourth ventricle :

Following features are seen in the floor

- (1) A median sulcus divides the floor into right and left halves
- (2) On either side of the midline, there is an elevation called median eminence. The eminence is bounded laterally, by the sulcus limitans

The following features are seen in relation to the medial eminence :

- (1) The facial colliculus is an elevation over the upper part of the eminence. It lies opposite the superior fovea. It is produced by the underlying abducent nucleus and the fibres of the facial nerve as they wind around the nucleus
- (2) The lower part of the eminence is occupied by the hypoglossal triangle. The hypoglossal nucleus lies deep to this triangle.
 - Superior fovea, a depression, which lies just lateral to the facial colliculus, similarly inferior fovea lies just above the vagal triangle.
 - The vestibular area lies lateral to the fovea. Part of it extends into the lateral recess and forms an elevation called the auditory tubercle. The tubercle overlies the dorsal cochlear nucleus and the cochlear nerve
 - The vagal triangle overlies the dorsal nucleus of vagus

90. (c) Cerebellar nuclei

(Ref : Snell's Neuro anatomy 4th/e pg 205)

Purkinje cell layer :

At the base of the purkinje cell, the axon arises and passes through the granular layer to enter the white matter. On entering the white matter, the axon acquires a myelin sheath and it terminates by

synapsing with cells of one of the intra cerebellar nuclei.

- ◆ Collaterals from Purkinje axons make synaptic contacts with the dendrites of basket and stellate cells of the granular layer in the same area or in distant folia.
- ◆ A few purkinje cell axons pass directly to end in the vestibular nuclei of the brainstem

91. (d) Fasciculus gracilis

(Ref : Gray's A 39th/e pg 314,315)

- ◆ The dorsal funiculus (also called dorsal column) on each side of the cord consists of two large ascending tracts, the fasciculus gracilis and fasciculus cuneatus
- ◆ Contain a high proportion of myelinated fibres carrying proprioception, exteroceptive (touch- pressure) information, including vibratory sensation to higher levels.
- ◆ The fasciculus gracilis begins at the caudal end of the spinal cord. It contains long ascending branches of primary afferents, which enter the cord through ipsilateral dorsal spinal roots and ascending axons of the secondary neurons in laminae IV to VI of the ipsilateral dorsal horn. As the fibres ascend they are joined by axons of successive dorsal roots. Fibres entering in coccygeal and lower sacral regions are shifted medially by successive additions of fibres entering at higher levels.
- ◆ Fasciculus gracilis lies medial to the fasciculus cuneatus, which begins at the midthoracic level

92. (c) Destroyed by inflammation, irradiation & tumor

(Ref : Gray's A 39th/e pg 51)

- ◆ The blood brain barrier is located at the capillary endothelium within the brain
- ◆ It depends upon the presence of tight junctions between endothelium and a relative lack of transcytotic vesicular transport
- ◆ The tightness of the barrier depends upon the close apposition of astrocytes to blood capillaries
- ◆ Certain areas of brain where endothelial cells do not have tight junctions - circumventricular organs
- ◆ Unrestricted diffusion through the blood brain barrier is only possible for lipophilic substances.

Breakdown of the blood brain occurs in following:

- ◆ Ischaemia or infection
- ◆ Primary and metastatic tumors
- ◆ Postmortem finding in patients who are jaundiced
- ◆ Normally brain, spinal cord, and peripheral nerves remain unstained by the bile, except for the choroid plexus, which is often stained deep yellow

68 Anatomy

- ◆ Areas of recent infarct (1-3days), will be stained by bile pigment as a result of localised breakdown of the blood brain barrier.

93. (a) Corticonuclear fibres

(Ref : BDC Vol III, 4th/e pg 365, Table 28.24)

FIBRES IN THE INTERNAL CAPSULE

<u>Part</u>	<u>Descending tracts</u>	<u>Ascending tracts</u>
(1) Anterior limb	Frontopontine fibres (a part of corticoponto cerebellar pathway)	Anterior thalamic radiation (fibres from anterior and medial nuclei of thalamus)
(2) Genu	Corticonuclear fibres (a part of the pyramidal tract going to motor nuclei of cranial nerve forming their supranuclear pathway)	Anterior part of the superior thalamic radiation (fibres from posterior ventral nucleus of thalamus)
(3) Posterior limb	(1) Corticospinal tract (pyramidal tract for the upper limb, trunk and lower limb) (2) Corticopontine fibres (3) Corticorubral fibres	(1) Superior thalamic radiation (2) Fibres from globus pallidus to sub thalamic nucleus
(4) Retrolentiform part	(1) Parietopontine and occipito pontine fibres (2) Fibres from occipital cortex to superior colliculus and pretectal region	Posterior thalamic radiation made up of (1) Mainly by optic radiation (2) Partly by fibres connecting the parietal and occipital lobes to the thalamus (posterior part)
(5) Sublentiform part	(1) Parieto pontine and temporopontine fibres (2) Inter connection between temporal lobe & thalamus.	Auditory radiation

94. (a) Auditory agnosia;

(Ref : BDC Vol III, 4th/e pg 352, Table 28.2)

Functional area of the cerebral cortex

Lobe	Area	Area No.	Location	Function	Effect of lesion
1. Temporal lobe	1. Auditosensory area 2. Auditop psychic area	41,42 22	Posterior part of superior temporal gyrus and anterior transverse temporal gyrus Rest of the superior temporal gyrus	Reception & perception of isolated auditory impressions of loudness, quality & pitch correlation of auditory impressions with part memory & identification (interpretation of sounds heard)	Impaired Hearing Auditory agnosia

70 Anatomy

95. (a) Medial lemniscus

(d) Spinothalamic

(e) Trigeminal lemniscus

Ref: Gray's A 39th/e pg 373

♦ The ventral posterior (VP) nucleus is the principal thalamic relay for the somatosensory pathways

♦ It is thought to consist of two major divisions.

(1) Ventral posterolateral (Vpl) nucleus

(2) Ventral posteromedial (Vpm) nucleus

(1) Vpl receives the medial lemniscal and spinothalamic pathways

(2) Vpm receives the trigemino thalamic pathway

Connections from the vestibular nuclei and lemniscal fibres terminate along the ventral surface of the VP nucleus.

96. (a) Anterior

Ref: Gray's A 39th/e pg 371

The anterior nuclei have three sub divisions

(a) Largest - Anteroventral nucleus

(b) Anteromedial nucleus

(c) Anterodorsal nucleus

♦ The anterior nuclei are the principal recipients of the mamillothalamic tract, which arises from the mammillary nuclei of the hypothalamus

♦ The mammillary nuclei receive fibres from the hippocampal formation via the fornix

♦ The nuclei of the anterior group also receive a prominent cholinergic input from the basal forebrain and the brain stem.

♦ The anterior thalamic nuclei are believed to be involved in the regulation of alertness and attention and in the acquisition of memory.

97. (b) Reticular nuclei

(Ref: Snell's Neuroanatomy 4th/e pg 438)

♦ The reticular nucleus is a thin layer of nerve cells sandwiched between the external medullary lamina and the posterior limb of the internal capsule

♦ Afferent fibres converge on this nucleus from the cerebral cortex and the reticular formation and its output is mainly to other thalamic nuclei.

♦ The function of this nucleus is not fully understood, but it may be concerned with a mechanism by which the cerebral cortex regulates thalamic activity.

98. (c) Dorsal nucleus of vagus

(Ref : Snells Neuroanatomy 4th/e pg 418, BDC 4th/e III / 335)

The vagus nerve has three nuclei:

- (1) The main motor nucleus
- (2) The parasympathetic nucleus
- (3) The sensory nucleus
- (2) Parasympathetic nucleus :-

The nucleus forms the dorsal nucleus of vagus and lies beneath the floor of the lower part of the fourth ventricle posterolateral to the hypoglossal nucleus

Afferent:

- From the hypothalamus through the descending autonomic pathways
- Afferents from glossopharyngeal nerve (carotid sinus reflex)

Efferent:

- Fibres are distributed to the
- (1) Involuntary muscles of bronchi
- (2) Heart
- (3) Oesophagus
- (4) Stomach
- (5) Small intestine
- (6) Large intestine as far as the distal one third of the transverse colon

Hence it belongs to the general visceral efferent column.

99. (a) Limiting sulcus

(Ref : BDC Vol III, 4th/e pg 347)

(1) Limiting sulcus

It separates at its floor in to two areas which are different functionally and structurally. An example is central sulcus between the motor and sensory areas

(2) Axial sulcus

Develops in the long axis of a rapidly growing homogenous area. e.g., is postcalcarine sulcus in the long axis of the striate area.

(3) Operculated sulcus

Separates by its lips two areas and contains a third area in the wall of the sulcus. eg: lunate sulcus

(4) Secondary sulcus

Produced by factors other than the exuberant growth in the adjoining areas of the cortex. e.g - lateral and Parieto occipital sulci.

(5) Complete sulcus :

Very deep so as to cause elevations in the walls of the lateral ventricle - eg : collateral & calcarine sulci.

Abdomen

Questions

- 100. Which of the following stimulus does not induce visceral pain - (AI - 99)**
- a. Distension
 - b. Pressure
 - c. Cauterisation
 - d. Cutting
- 101. Length of a spermatozoa - (CUPGEE 02)**
- a. 50 μ m (micrometers)
 - b. 100 μ m
 - c. 120 μ m
 - d. 500 μ m
- 102. The first event to occur in the micturition reflex is - (AIIMS 98)**
- a. Relaxation of sphincter
 - b. Detrusor contraction
 - c. Relaxation of perineal muscles
 - d. Activity of EMG stops at external sphincter
- 103. Hydatids of morgagni are - (JIPMER 79, Bihar 89)**
- a. Hydatid cysts in the brain
 - b. Hydatid cysts in the thorax
 - c. Subcutaneous hydatid cysts
 - d. None of the above
- 104. Capacity of stomach of newborn - (Calcutta 2K)**
- a. 20 ml
 - b. 30 ml
 - c. 50 ml
 - d. 100 ml
- 105. Lymphatics of ovary drains into (AI 91)**
- a. Paraaortic LN
 - b. Internal iliac LN
 - c. External iliac LN
 - d. Obturator LN

- 106. All are supports of uterus except - (AIIMS 92)**
- a. Uterosacral ligament
 - b. Round ligament of uterus
 - c. Mackenrodt's ligament
 - d. Transverse cervical ligament
- 107. The sensory nerves from the cervix pass through the - (DNB 89)**
- a. Lumbar 4,5
 - b. Sacral 2,3,4
 - c. Pudendal nerve
 - d. Ilio inguinal nerve
- 108. The branches of internal iliac artery include all of the following except - (KAR 94)**
- a. Uterine artery
 - b. Middle rectal artery
 - c. Obturator artery
 - d. Inferior epigastric artery
- 109. The principal factor causing the rupture of the graafian follicle is - (kerala 2K)**
- a. Increase in the intra follicular pressure
 - b. Necrobiosis of the overlying tissue
 - c. All of the above
 - d. None of the above
- 110. The superior rectal artery arises from the - (AIIMS 85)**
- a. Superior mesenteric artery
 - b. Inferior mesenteric artery
 - c. Internal iliac artery
 - d. Internal pudendal artery
- 111. Appendicular artery is a branch of - (PGI 85)**
- a. Ileocolic artery
 - b. Right colic artery
 - c. Middle colic artery
 - d. Posterior cecal artery
- 112. The length of CBD is - (PGI 85)**
- a. 5 cm
 - b. 7.5 cm
 - c. 8.0 cm
 - d. 9 cm

74 Anatomy

- 113. Caudate lobe of liver is situated between - (PGI 90)**
- a. Gall bladder & groove for ligamentum teres
 - b. IVC and ligamentum venosum
 - c. Posterior part of left lobe
 - d. Anterior superior surface of liver
- 114. Transpyloric plane passes through - (Kerala 91)**
- a. T2- L1
 - b. L5- S1
 - c. T10
 - d. L1-L2
- 115. Fascia of Denonvilliers - (Karn 94)**
- a. Membranous layer of fascia of the thigh
 - b. Perirenal fascia
 - c. Fascia between the rectal ampulla and the prostate and the seminal vesicle
 - d. Posterior layer of the perirenal fascia
- 116. Pancreatico splenic lymph nodes receive lymphatics from the part of the stomach which is supplied by - (ICS 2K)**
- a. Left gastric artery
 - b. Short gastric arteries and left gastro epiploic artery
 - c. Right gastro epiploic artery
 - d. Right gastric artery
- 117. Most common type of diaphragmatic hernia - (JIPMER 85)**
- a. Bochdalek's hernia
 - b. Morgagni's hernia
 - c. Hernia through dome
 - d. Hiatus hernia
- 118. Normal portal venous pressure is - (JIPMER 87)**
- a. 5- 8 mm Hg
 - b. 6-12mm Hg
 - c. 12-15mm Hg
 - d. 45mm Hg
- 119. Renal collar is formed by splitting into two limbs and encircling the aorta by - (AI 99)**
- a. Horse - shoe kidney
 - b. Renal artery
 - c. Left renal vein
 - d. None of the above

- 120. The least dilatable part of the urethra - (CUPGEE 95)**
- a. Prostatic
 - b. Membranous
 - c. Spongy
 - d. All are equally dilatable
- 121. During abdominal surgery under local anaesthesia patient suddenly felt sharp pain. Injury to structure likely involved - (AIIMS 2K)**
- a. Liver parenchyma
 - b. Large gut
 - c. Small gut
 - d. Parietal peritoneum
- 122. The development of diaphragm is from - (AIIMS 81)**
- a. Septum transversum
 - b. Pleuropericardial membranes
 - c. Pleuroperitoneal membranes
 - d. (a) and (c) are true
 - e. (b) and (c) are true
- 123. The lesser peritoneal sac (omental bursa) is bounded - (PGI 78, AIIMS 75)**
- a. Anteriorly by the stomach
 - b. Posteriorly by the ileum
 - c. Posteriorly by the pancreas
 - d. Posteriorly by the lesser omentum
- 124. The posteroinferior surface of the liver is related to the - (JIPMER 78, PGI 80)**
- a. Right kidney
 - b. Hepatic flexure of the colon
 - c. Duodenum
 - d. Esophagus
- 125. Buck's fascia is related to - (JIPMER 78, AMU 86)**
- a. Ischiorectal fascia
 - b. Thigh
 - c. Neck
 - d. Penis

76 Anatomy

- 126.** Structure found in the superficial perineal space (pouch) of the male include the - (PGI 78,82)
- Bulb of the penis
 - Bulbo spongiosus muscle
 - Ischiocavernosus muscle
 - Superficial transverse perinei muscles
 - None
- 127.** The posterior wall of inguinal canal are formed by many structures that include - (JIPMER 79, PGI 87)
- Conjoint tendon
 - Transversus abdominis
 - Fascia transversalis
 - Lacunar ligament
- 128.** Which of the following statements concerning the nerve supply to the urinary bladder is / are correct (PGI 80) (AIIMS 83)
- The sympathetic post ganglionic fibre originate in the first and second lumbar ganglia
 - The parasympathetic preganglionic fibres synapse with post. ganglionic neurons in the inferior hypogastric plexus
 - The afferent sensory fibres arising in the bladder reach the spinal cord via the pelvic splanchnic nerves and also travel with the sympathetic nerves
 - The parasympathetic preganglionic fibres arise from S2, S3, S4
 - All of the above
- 129.** The right suprarenal gland is related to the - (JIPMER 80, PGI 81)
- Third part of the duodenum
 - Inferior vena cava
 - Transverse colon
 - Right lobe of the liver
- 130.** The coeliac nodes receive lymphatic drainage from the - (JIPMER 80, AMC 84)
- Liver
 - Spleen
 - Pancreas
 - Duodenum
 - All of the above

- 131. Parasympathetic outflow from sacral plexus is - (JIPMER 81, AP 91)**
- a. Nervi Erigentes
 - b. Nerve of Kuntz
 - c. Arnold's nerve
 - d. Jacobson's nerve
- 132. The urinary bladder in the male is - (PGI 81,82)**
- a. Posterior to the pubic symphysis
 - b. Anterior to the ampulla of the vas deferens
 - c. Superior to the prostate gland
 - d. Superior to the seminal vesicles
- 133. Superficial fatty fascia between umbilicus & pubis is - (PGI 82)**
- a. Camper's
 - b. Scarpa's
 - c. Colle's
 - d. Cilli's
- 134. The rectus sheath contains all of the following except - (AIIMS 82, AI 88)**
- a. Pyramidalis muscle
 - b. Genitofemoral nerve
 - c. Inferior epigastric
 - d. Superior epigastric vessels
- 135. The normal constrictions of the ureter are found - (AIIMS 83, PGI 87, 79)**
- a. Where the ureter begins at the junction of the renal pelvis and the ureter
 - b. Where the ureter passes through the bladder wall
 - c. Where the ureter crosses the common iliac artery or the pelvic brim
 - d. Where the ureter passes through the cardinal ligament
- 136. The chief blood supply of the greater omentum is _artery - (PGI 83)**
- a. Gastroduodenal
 - b. Right gastroepiploic
 - c. Left gastroepiploic
 - d. Superior pancreaticoduodenal
- 137. The boundaries of morison's pouch are - (PGI 84)**
- a. Inferior surface of liver
 - b. Anterior abdominal wall
 - c. Falciform ligament
 - d. Peritoneum over right kidney
 - e. Coronary ligament

78 Anatomy

- 138. Nerve supply of pyramidalis muscle is - (PGI 84)**
- a. Ilioinguinal nerve
 - b. Subcostal nerve
 - c. Genitofemoral nerve
 - d. None
- 139. It is true that the gall bladder - (AIIMS 84)**
- a. Is supplied by cystic artery which has an accompanying vein on its left side
 - b. Is drained by veins into the liver
 - c. Has a fundus which projects beyond the liver
 - d. Has an infundibulum which projects downwards joining a pouch
- 140. The superior mesenteric artery arises opposite the vertebra - (AIIMS 85)**
- a. T12
 - b. L1
 - c. L2
 - d. L3
- 141. The right adrenal vein drains into - (AIIMS 85)**
- a. Right renal vein
 - b. I.V.C
 - c. Lumbar veins
 - d. Left renal vein
- 142. Deep inguinal ring is a defect in the - (UPSC 85, PGI 87, JIPMER 87, AI 88, Kerala 90)**
- a. External oblique
 - b. Internal oblique
 - c. Transversus abdominis
 - d. Transversus fascia
 - e. Peritoneum
- 143. Carcinoma prostate commonly occurs in the (PGI 85)**
- a. Anterior
 - b. Posterior
 - c. Lateral
 - d. Middle

- 144. Which of the following statements concerning the ovary is / are correct - (AIIMS 86)**
- a. The lymph drainage is into the para-aortic (lumbar) lymph nodes at the level of the L1 vertebra
 - b. The ligament of the ovary extends from the ovary to the upper end of the lateral wall of uterus
 - c. The ovarian fossa is bounded above by the external iliac vessels
 - d. The obturator nerve usually lies lateral to the ovary
- 145. The shortest part of colon is (AP 86, Delhi 86)**
- a. Ascending colon
 - b. Transverse colon
 - c. Descending colon
 - d. Sigmoid colon
- 146. Lymphatic drainage of the anal canal is to - (AIIMS 86, UPSC 87, Kerala 87)**
- a. Inguinal
 - b. Lymph nodes
 - c. External iliac nodes
 - d. Para - aortic
 - e. None of the above
- 147. Which of the following about meckel's diverticulum is false - (PGI 86, AI 88)**
- a. Present in 2% of population
 - b. Occurs at 2 feet form the ileocaecal junction
 - c. Posses all 3 coats of intestinal wall
 - d. Arises from the mesenteric border of ileum
- 148. The structures in the free border of the lesser omentum anterior to posterior are - (PGI 86, UPSC 87, AI 88)**
- a. CBD, Hepatic artery, Portal vein
 - b. Portal vein, hepatic artery, CBD
 - c. (a) and (b)
 - d. Portal vein, CBD, hepatic artery
- 149. Lymphatic drainage of the umbilicus is to - (PGI 87, UPSC 87, NIMHANS 86, Kerala 90)**
- a. Axillary nodes
 - b. Inguinal nodes
 - c. (a) and (b)
 - d. Porta hepatis
 - e. Coeliac axis nodes

150. The kidney has _____ segments (PGI 87)

- a. 11
- b. 9
- c. 7
- d. 5

151. The neurovascular bundle in the anterior abdominal wall is situated between - (PGI 87)

- a. The subcutaneous tissue and ext. oblique muscle
- b. External oblique and internal oblique
- c. Internal oblique and transversus abdominis
- d. Transversus abdominis & peritoneum

152. Fascia extension of lacunar ligament along iliopectineal line is - (PGI 88)

- a. Poupart ligament
- b. Thomson's ligament
- c. Cooper's ligament
- d. Lacunar ligament

153. All of the following muscles are posterior to the right & left kidneys except - (AIIMS 88)

- a. Psoas major
- b. Latissimus dorsi
- c. Quadratus lumborum
- d. Transversus abdominis

154. The pancreatic bed does not include - (AMU 88)

- a. Left kidney
- b. Splenic artery
- c. Left renal vein
- d. Left crus of diaphragm

155. Fascia of Gerota is - (TN 89)

- a. True capsule
- b. Renal fascia
- c. Fatty capsule
- d. Thoracolumbar fascia

156. Internal pudendal artery is a branch of (AIIMS 89)

- a. Anterior division of Internal iliac
- b. Posterior division of Internal iliac
- c. Obturator artery
- d. Hypogastric

- 157. Xiphisternal junction is usually at the level of disc between the following thoracic vertebra - (DNB 90)**
- a. 9 and 10
 - b. 8 and 7
 - c. 1 and 12
 - d. None
- 158. The attachment of the mesentery of the small gut is - (PGI 90, AIIMS 86)**
- a. Lt. transverse process of L2 to Rt. sacroiliac joint
 - b. Rt. transverse process of L2 to Rt. sacroiliac joint
 - c. Lt. transverse process of T1 to Rt. sacroiliac joint
 - d. Rt. transverse process of T1 to Lt. sacroiliac joint
 - e. None of the above
- 159. Embryonic ventral mesogastrium gives rise to - (AIIMS 91)**
- a. Greater omentum
 - b. Lesser omentum
 - c. Pelvic mesocolon
 - d. Gastro splenic ligament
- 160. Urethra of female - (DNB 91)**
- a. Has only connective tissue in its upper third
 - b. Has only smooth muscle in its wall
 - c. Is shorter than in male
 - d. Is longer than in male
- 161. Duodenum is developed from - (TN 91)**
- a. Foregut
 - b. Midgut
 - c. Foregut & midgut
 - d. Hindgut
- 162. The following is true regarding spleen - (AIIMS 91)**
- a. Notch is on inferior border
 - b. Long axis parallel to 12th Rib
 - c. Developed from ventral mesogastrium
 - d. Nerve supply from coeliac plexus
- 163. The inferior hypogastric plexus is located (SGPGI 04)**
- a. Anterior to aorta
 - b. Behind the kidney
 - c. Between layers of anterior abdominal wall
 - d. On the side of rectum

82 Anatomy

- 164. The efferent limb of the cremaster reflex is provided by the - (UP PGME 04)**
- a. Femoral branch of genitofemoral nerve
 - b. Genital branch of the genitofemoral nerve
 - c. Ilioinguinal nerve
 - d. Pudendal nerve
- 165. Blood supply of stomach is / are : (PGI 03)**
- a. Left gastric artery
 - b. Short gastric artery
 - c. Splenic artery proper
 - d. Renal artery
 - e. Lt. gastroepiploic artery
- 166. Blood vessel related to paraduodenal fossa is - (AI-03)**
- a. Gonadal veins
 - b. Superior mesenteric artery
 - c. Portal vein
 - d. Inferior mesenteric vein
- 167. The first costochondral joint is a - (AI - 04)**
- a. Fibrous joint
 - b. Synovial joint
 - c. Syndesmosis
 - d. Synarthrosis
- 168. Blood supply of sigmoid colon is by (PGI 2000)**
- a. Middle colic A
 - b. Marginal artery
 - c. Left colic artery
 - d. Sigmoid artery
- 169. Not true about the anal canal is (PGI 99)**
- a. Completely lined by stratified squamous epithelium
 - b. Supplied by pudendal nerve
 - c. Drained by veins forming portosystemic anastomosis
 - d. Part below pectinate line is supplied by inferior rectal artery
- 170. All the statements are true about ileum except (PGI 98)**
- a. LN in mesentery
 - b. 3-6 arcades in continuation
 - c. Smaller diameter than jejunum
 - d. Large circular mucosal folds

- 171. True about foramen of bochdalek is (PGI 97)**
- a. Postero lateral gap in diaphragm
 - b. Anterolateral gap in diaphragm
 - c. Pleuro-pericardial gap
 - d. Gap in muscle fibres
- 172. A patient of external piles has pain, which of the following nerves carry this pain sensation (AI - 2002)**
- a. Hypogastric nerves
 - b. Parasympathetic plexus
 - c. Sympathetic nerve
 - d. Pudendal nerve
- 173. The architecture of liver is divided into lobes by (PGI 2002)**
- a. Bile duct
 - b. Hepatic artery
 - c. Hepatic vein
 - d. Portal vein
 - e. Lymphatics
- 174. The contents of the sacral canal are all except - (AI 93)**
- a. Filum terminale
 - b. Dura
 - c. L4-L5 Nerve roots
 - d. Vertebral venous plexus
- 175. Epoophoron is a remnant of (PGI 95)**
- a. Wolffian duct
 - b. Mullerian duct
 - c. Gubernaculum
 - d. None

Abdomen

Answers

100. (c) Cauterisation

(d) Cutting

(Ref : BDC 4th/e vol. II - pg 323)

◆ Viscera are insensitive to

- cutting
- crushing
- burning

◆ However visceral pain is caused by

(1) Excessive distension

(2) Spasmodic contraction of smooth muscles

(3) Ischemia

◆ The pain felt in the region of the viscera is called true visceral pain

◆ Referred pain :

Pain arising in viscera may also be felt in the skin or other somatic tissues, supplied by somatic nerves arising from the same spinal segment

◆ If the inflammation spreads from a diseased viscera to the parietal peritoneum it causes local somatic pain overlying body wall

◆ In acute appendicitis pain is at first felt in the peri umbilical region (T10) and then is localised to Mcburney's point.

101. (a) 50 μm

Ref : Gray's 39th/e pg 1308, 1309 fig 97.7

The measurements of different parts of spermatozoon :-

(1) Head - 4.0 μm

(2) Neck - 0.3 μm

(3) Middle piece - 7 μm

(4) Principal piece - 40 μm

(5) End piece - 5-7 μm

Approximately 58.3 μm

The closest to this answer is Ans (a) 50 μm

◆ As it is released from the wall of the seminiferous tubule into the lumen, the spermatozoon is non-motile but structurally mature.

◆ Its expanded head contains little cytoplasm and is connected by a short constricted neck to the tail

◆ The tail is a complex flagellum and is divided into middle, principal and end pieces

- ◆ The head contains the elongated flattened nucleus with condensed, deeply staining chromatin and the acrosomal cap anteriorly, which contains acid phosphatase, hyaluronidase, neuraminidase and proteases necessary for fertilisation
- ◆ In the centre of the neck, is a well - formed centriole, corresponding to the proximal centriole of the spermatid from which it differentiated
- ◆ The axonemal complex is derived from the distal centriole
- ◆ A small amount of cytoplasm exists in the neck covered by plasma membrane continuous with that of the head & tail
- ◆ The middle piece - a long cylinder - consists of an axial bundle of microtubules, the **axoneme**, outside which is a cylinder of nine dense outer fibres, surrounded by a helical mitochondrial sheath
- ◆ The annulus is an electron - dense body at the caudal end of the middle piece
- ◆ The principal piece - motile part of cell - The axoneme and the surrounding dense fibres are continuous from the neck region through the whole length of the tail except for its terminal 5-7 μm , in which the axoneme alone persists.
- ◆ The end piece has a typical structure of a flagellum, with a simple nine plus two arrangement of microtubules.

102. (c) Relaxation of perineal muscles

(Ref : BDC 4th/e vol. II - pg 351)

Micturition :-

- (1) Initially the bladder fills without much rise in the intravesical pressure, due to the adjustment of bladder tone
- (2) When the quantity of urine exceeds 220 C.C., the intravesical pressure rises, this stimulates sensory nerves and produces a desire to micturate.
- (3) If this is neglected, rhythmic reflex contractions of the detrusor muscle start, which become more and more powerful as the quantity of urine increases, and it later on becomes painful.
- (4) The voluntary holding of urine is due to the contraction of the sphincter urethrae and of the perineal muscles with coincident inhibition of the detrusor muscle.
- (5) Micturition is initiated by the following successive events :-
 (a) First there is a relaxation of perineal muscles, **except the sphincter urethrae** and contraction of the abdominal muscles
 (b) This is followed by firm contraction of the detrusor and relaxation of sphincter vesicae
 (c) Lastly, the sphincter urethrae muscle relaxes and the flow of urine begins
- (6) Bladder is emptied by the contraction of the detrusor muscle. Emptying is assisted by the contraction of abdominal muscles.
- (7) When urination is complete, the detrusor muscle relaxes, the sphincter vesicae contracts, and finally the sphincter urethrae

contracts: In the males, the last drops of urine is expelled from the bulbar portion of urethra by contraction of the bulbospongiosus.

103. (d) None of the above

(Ref : BDC 4th/e vol. II - pg 220)

Embryological remnants present in relation to testes

Their importance is that they may sometimes form cysts

- (1) The appendix of testis
- (2) The appendix of epididymis or pedunculated hydatid of morgagni is a small rounded, pedunculated body attached to the head of the epididymis. It represents the cranial end of the mesonephric duct
- (3) Superior aberrant ductules, one or two, are attached to the tail of the epididymis and represent the intermediate mesonephric tubules. One of them which is more constant may be as long as 25cm.
- (4) The paradidymis or organ of Giraldes consists of free tubules lying in the spermatic cord above the head of epididymis. They are neither connected to the epididymis, nor to the testis and represent the caudal mesonephric tubules.

104. (b) 30ml

(Ref : BDC 4th/e vol. II - pg 238, 243)

Size of the stomach :

- ◆ 25cm long
- ◆ Mean capacity is 30ml (one ounce) at birth and, one litre at puberty
- ◆ 1.5 to 2 liters or more in adults

Two orifices :-

◆ Cardiac orifice :

- Joined by lower end of esophagus
- Lies behind the left 7th costal cartilage 2.5cm from its junction from sternum, at T11 vertebral level
- There is physiological evidence of sphincteric action at this site, but a sphincter cannot be demonstrated anatomically

◆ Pyloric orifice :

- Opens into duodenum
- In an empty stomach and in supine position, it lies 1.2cm to the right of median plane at the level of the lower border of vertebra L1 or transpyloric plane
- Gastric pain is felt in the epigastrium because the stomach is supplied from segments T6 to T10 of the spinal cord, which also supply the upper part of the abdominal wall. Pain is produced either by spasm of muscle or by over distention. Ulcer pain is attributed to local spasm due to irritation

- Peptic ulcer can occur in sites of pepsin and hydrochloric acid namely the
 - (a) Stomach
 - (b) First part of duodenum
 - (c) Lower end of esophagus and
 - (d) Meckel's diverticulum
- ◆ Gastric ulcer occurs typically along the lesser curvature due to :
 - (1) It is homologous to the gastric trough of ruminants
 - (2) Mucosa is not freely movable over the muscular coat
 - (3) The epithelium is comparatively thin
 - (4) Blood supply is less abundant and there are fewer anastomoses
 - (5) Nerve supply is more abundant with large ganglia
 - (6) Because of the gastric canal, it receives most of the insult from irritating drinks.
 - (7) Being shorter in length the wave of the contraction stays longer at a particular point, Viz., the standing wave of incisura.
- ◆ Gastric carcinoma is common and occurs along the greater curvature.
- Metastasis can occur through the thoracic duct to the left supra clavicular lymph node (Trocier's sign)
- ◆ Pyloric obstruction can be congenital or acquired. It causes
 - Visible peristalsis in the epigastrium
 - and vomiting after feeds/ meals

105. (a) Para-aortic LN

(Ref : BDC 4th/e vol. II - pg 355)

Ovary

Arterial supply :-

- (1) The ovarian artery : arising from the abdominal aorta just below the renal artery - via the suspensory ligament of ovary - sends branches through the mesovarium - continues medially through broad ligament of uterus to anastomose with uterine artery
- (2) The uterine artery - through mesovarium

Venous drainage :-

- ◆ Vein emerges at hilus of ovary - forming a pampiniform plexus - forming a vein at pelvic inlet and the right ovarian vein drains into → IVC; left ovarian veins drains into → (Lt) Renal vein

Lymphatic drainage :

The lymphatics from the ovary communicate with the lymphatics from the uterine tube and fundus of the uterus. They ascend along the ovarian vessels to drain into the lateral aortic and preaortic nodes.

Nerve supply :-

The ovarian plexus : derived from

- (1) Renal
- (2) Aortic

- (3) Hypogastric plexus
→Accompanies the ovarian artery
→It contains both sympathetic and parasympathetic nerves
→Sympathetic nerves (T10, T11) are afferent for pain as well as efferent or vasmotor
→Parasympathetic nerves (S2,S3,S4) are vasodilators

106. Ans : None

(Ref : BDC 4th/e vol. II - pg 361)

The uterus is supported by the following factors/ structures :-

Primary supports

(A) Muscular or active supports :

- (1) Pelvic diaphragm
- (2) Perineal body
- (3) Urogenital diaphragm

(B) Fibromuscular or mechanical supports

- (1) Uterine axis
- (2) Pubocervical ligaments
- (3) Transverse cervical ligaments of - Mackenrodt
- (4) Uterosacral ligaments
- (5) Round ligaments of uterus

Secondary supports :-

These are of doubtful value :-

- (1) Broad ligaments
 - (2) Uterovesical folds of peritoneum
 - (3) Rectovaginal fold of peritoneum
- (Gray's 39th/e pg 1333) says that

"While the uterosacral and transverse cervical ligaments may act in varying measures as mechanical supports of the uterus, levator ani and coccygei, the urogenital diaphragm and perineal body appear at least as important in this respect"

(Shaw's textbook of Gynaecology, 13th/e pg 10,17,19) states that 'Prolapse of the genital tract, stress incontinence of urine and faecal incontinence are all related to laxity & atonicity of the muscles of the pelvic floor as well as denervation of pelvic nerves during childbirth'

and

"The supports of uterus and the bladder are seen to be triradiate condensation of endopelvic fascia :-

- (1) The anterior spoke is the pubocervical fascia or so called pubocervical ligament
- (2) The lateral spoke is the mackenrodt's ligament
- (3) The posterior spoke is the uterosacral ligament

and

"There is no evidence that the normal position of anteflexion & anteversion of the uterus is produced by contraction of the round ligament". So only B.D.C. mentions round ligament as one of the supports of uterus.

107. (b) Sacral 2,3,4

(Ref : BDC 4th/e vol. II - pg 360, 361)

Nerve supply of uterus :-

◆ The uterus is richly supplied by both sympathetic and parasympathetic nerves, through the **inferior hypogastric and ovarian plexuses**.

- Sympathetic nerves from T12, L1 segment of spinal cord produce **uterine contraction and vasoconstriction**
- The parasympathetic nerves (S2,S3,S4) produce uterine inhibition and vasodilatation

These effects are complicated by the pronounced effects of hormones

◆ Pain sensation from the body of uterus pass along the sympathetic nerves and from the cervix, along the parasympathetic nerves i.e, (S2,S3,S4)

108. (d) Inferior epigastric artery

(Ref : BDC 4th/e vol. II - pg 387)

◆ Internal iliac artery is the smaller terminal branch of the common iliac artery. It is 3.75cm long

◆ It supplies :-

- (1) The pelvic organs except those supplied by superior rectal, ovarian and median sacral arteries
- (2) The perineum
- (3) The greater part of the gluteal region
- (4) The iliac fossa

◆ It has two divisions :

- (1) Anterior, and
- (2) Posterior

(1) Branches of the anterior division - (Six)

a. Superior vesical A - After birth the proximal part of the umbilical artery persists to form the first part of superior vesical artery and the rest of it degenerates into a fibrous cord, the median umbilical ligament.

b. Obturator A

c. Middle rectal

d. Inferior vesical

e. Inferior gluteal } terminal branches

f. Internal pudendal

In the female there is a seventh branch :-

- The uterine artery
- The inferior vesical artery is replaced by the vaginal artery

Branches of the posterior division :-

- (1) Iliolumbar
- (2) Two lateral sacral (2)
- (3) Superior gluteal arteries

109. (b) Necrobiosis of the overlying tissue

(Ref : Gray's 39th/e pg 1325)

"Although a number of follicles may progress to the secondary stage by about the first week of a menstrual cycle usually only one follicle from either one of the two ovaries, proceeds to the tertiary stage and the remainder become atretic. The surviving follicle increases in size considerably as the antrum takes up fluid from the surrounding tissues expands upto a diameter of 2-cm. The cumulus oophorus surrounding the oocyte thins. The term graffian follicle is used to describe this mature follicle stage. The oocyte and a surrounding ring of tightly adherent cells, the corona radiata, breaks away from the follicle wall and floats freely in the follicular fluid.

- ◆ The primary oocyte, which has remained in the first meiotic prophase since fetal life, completes its first meiotic division to produce the almost equally large secondary oocyte and a minute first polar body with very little cytoplasm
- ◆ The secondary haploid oocyte immediately begins its second meiotic division, but when it reaches metaphase, the process is arrested until fertilisation has occurred.
- ◆ The follicle moves to the superficial cortex causing the surface of the ovary to bulge
- ◆ The tissues at the point of contact (the stigma) with tough tunica albuginea and ovarian surface epithelium are eroded until the follicle ruptures and its contents are released into the peritoneal cavity for capture by the fimbria of the uterine tube"

110. (b) Inferior mesenteric artery

(Ref : BDC 4th/e vol. II - pg 266)

Inferior mesenteric artery :-

- ◆ Artery of the hindgut
- ◆ Supplies - left one third of transverse colon
 - descending colon
 - sigmoid colon
 - the rectum
 - the upper part of-anal canal, above the anal valves
- ◆ Arises from the front of the abdominal aorta behind the third part of the duodenum, at the level of the third lumbar vertebra, and 3 to 4 cm above the bifurcation of the aorta.
- ◆ Branches :
 - (1) Left colic Artery (or) superior left colic artery
 - (2) Sigmoid arteries (or) Inferior left colic arteries
 - (3) Superior rectal artery

Superior mesenteric artery :-

- ◆ Artery of the midgut
- ◆ Branches are : 5 sets of branches from both its left & right sides from the right are

- (1) Inferior pancreaticoduodenal
- (2) Middle colic
- (3) Right colic
- (4) Iliocolic

◆ From the left are 12-15 jejunal & ileal branches.

Celiac trunk :-

- ◆ Artery of the foregut
- ◆ Supplies -
 - (1) Lower end of oesophagus
 - (2) Stomach and upper part of duodenum upto the opening of common bile duct
 - (3) The liver
 - (4) The spleen
 - (5) The greater part of the pancreas

Branches :-

- (1) Left gastric artery
- (2) Common hepatic artery
 - (a) The gastroduodenal artery
 - (1) Right gastroepiploic
 - (2) Superior pancreaticoduodenal
 - (b) The right gastric artery
 - (c) The supraduodenal artery
 - (d) The cystic artery
- (3) Splenic artery - the largest branch of celiac trunk
 - (a) Numerous pancreatic branches
 - (b) 5 - 7 short gastric arteries
 - (c) Left gastroepiploic artery

111. (a) Ileocolic artery

(Ref : BDC 4th/e vol. II - pg 258)

Blood supply of appendix :

- ◆ The appendicular artery is a branch of the lower division of the ileocolic artery
- ◆ It runs behind the terminal part of ileum & enters the mesoappendix at a short distance from its base
- ◆ Here it gives a recurrent branch which anastomoses with a branch of posterior caecal artery
- ◆ The main artery runs towards the tip of the appendix lying at first near to and then in the free border of the mesoappendix
- ◆ The terminal part of the artery lies actually on the wall of the appendix
- ◆ Blood from the appendix is drained by the appendicular, ileocolic and superior mesenteric veins to the portal vein
- ◆ Most of the lymphatics → ileocolic nodes, but a few of them pass directly through → appendicular nodes situated in the mesoappendix.

112. (c) 8cm

(Ref : BDC 4th/e vol. II - pg 275)

Hepatic ducts :-

- ◆ The right and left hepatic ducts emerge at the porta hepatis from the right & left lobes of the liver
- ◆ The arrangement of structures at the porta hepatis from behind forwards is
 - (1) Branches of the portal vein
 - (2) Hepatic artery
 - (3) Hepatic ducts

Common hepatic duct :-

- ◆ Formed by the union of the right & left hepatic ducts near the right end of the porta hepatis
- ◆ It runs downwards for about 3cm and is joined by on its right side at an acute angle by cystic duct

Cystic duct :-

- ◆ Cystic duct is about 3-4cm long
- ◆ The mucous membrane of cystic duct forms a series of 5 to 12 crescentic folds, arranged spirally to form the so-called "spiral valve" of Heister. This is not a true valve.

Bile duct :

- ◆ Bile duct is formed by union of cystic duct & common hepatic ducts
- ◆ It is 8cm long and has a diameter of about 6mm

Relations of bile duct :-(A) Supraduodenal part in the free margin of lesser omentum

- (1) Anteriorly : liver
- (2) Posteriorly - portal vein & epiploic foramen
- (3) To the left - Hepatic artery

(B) Retroduodenal part :

- (1) Anteriorly - First part of duodenum
- (2) Posteriorly - Inferior vena cava
- (3) To the left - Gastroduodenal artery

(C) Infraduodenal part :-

- (1) Anteriorly - A groove in the upper & lateral parts of the posterior surface of the head of the pancreas
- (2) Posteriorly - Inferior vena cava

(D) Intra - duodenal part

113. (b) IVC and ligamentum venosum

(Ref : BDC 4th/e vol. II - pg 289)

Lobes of liver: (Anatomical)

- ◆ The liver is divided into right and left lobes by the attachment of the
 - falciform ligament - anteriorly & superiorly
 - fissure for the ligamentum teres inferiorly
 - fissure for the ligamentum venosum

- ◆ The right lobe presents the caudate & the quadrate lobes
- ◆ The caudate lobe is situated on the posterior surface and is bounded on the right by the groove for IVC and on the left by the fissure for the **ligamentum venosum** and inferiorly by porta hepatis
- ◆ The quadrate lobe is situated on the inferior surface and is rectangular, bounded
 - anteriorly → inferior border of liver
 - posteriorly → porta hepatis
 - On right → fossa for the gall bladder
 - On left → fissure for **ligamentum teres**

114. (d) L1 - L2

(Ref : BDC 4th/e vol. II - pg 194)

The transpyloric plane :

- ◆ The transpyloric plane is an imaginary transverse plane often referred to in anatomical descriptions
- ◆ Anteriorly, it passes through the tips of the ninth costal cartilages and posteriorly, through the lower part of the body of the first lumbar vertebra.
- ◆ The plane lies midway between the suprasternal notch and the pubic symphysis
- ◆ It is roughly a hand's breadth below the xiphio-sternal joint
- ◆ The costal margin reaches its lowest level in the mid - axillary line. Here the margin is formed by the tenth costal cartilage
- ◆ The transverse plane passing through the lowest part of the costal margin is called the subcostal plane
- ◆ Posteriorly subcostal plane passes through the third lumbar vertebra

115. (c) Fascia between the rectal ampulla and the prostate and the seminal vesicles

(Ref : BDC 4th/e vol. II - pg 380)

Supports of rectum

(1) Pelvic floor formed by levator ani muscles

(2) Fascia of waldeyer :-

It attaches the lower part of the rectal ampulla to the sacrum. It encloses the superior rectal vessels and lymphatics

(3) Lateral ligaments of the rectum :-

They are formed by condensation of the pelvic fascia on each side of the rectum. They enclose the middle rectal vessels, the branches of pelvic plexuses, and attach the rectum to the posterolateral walls of the lesser pelvis

(4) Rectovesical fascia of denonvilliers :-

It extends from the rectum behind to the seminal vesicles and prostate in front

- (5) The pelvic peritoneum and the related vascular pedicles also help in keeping the rectum in position
- (6) Perineal body with its muscles

116. (b) Short gastric arteries and left gastroepiploic artery

(Ref : BDC 4th/e vol. II - pg 241)

Lymphatic drainage of stomach :-

The stomach can be divided into four lymphatic territories. The drainage of these areas is as follows

Area 'a' - pancreatosplenic area :

Pancreato splenic nodes lying along the splenic artery i.e. on the back of the stomach

Lymph vessels from these nodes travel along the splenic artery to reach the coeliac nodes.

The left gastroepiploic artery, a branch of the splenic and 5-7 short gastric arteries, which are also branches of the splenic artery.

Area 'b' - drains into the left gastric nodes lying along the artery of the same name. These nodes also drain the abdominal part of the oesophagus. lymph from these nodes drains into the coeliac nodes

Area 'c' - drains into the right gastroepiploic nodes that lie along the artery of the same name. lymph from here → subpyloric nodes which lie in the angle between the first and second parts of the duodenum → hepatic nodes that lie along hepatic artery → coeliac nodes.

Area 'd' - drains in different directions into pyloric, hepatic and left gastric nodes and passes from all these nodes to the coeliac nodes

117. (d) Hiatus hernia

(Ref : BDC 4th/e vol. II - pg 312)

Diaphragmatic Hernia may be

(A) Congenital

(B) Acquired

(A) Congenital

(1) Retrosternal hernia :-

- through the space between the xiphoid and costal origins of the diaphragm (or) Foramen of morgagni (or) space of larry.
- common on right side
- lies between the pericardium and (rt) pleura
- usually causes no symptoms

(2) Posterolateral hernia :-

- commonest type of congenital diaphragmatic hernia
- through the pleuroperitoneal hiatus or foramen of bochdalek situated at the periphery of diaphragm in the regions of the attachments to the 10th & 11th ribs.

- commoner on left side
- free communication between the pleural & peritoneal cavities
- may cause death within a few hrs of birth due to acute respiratory distress caused by abdominal viscera filling the left chest
- requires operation in the first few hours of life

(3) Posterior Hernia :-

- due to failure of development of the posterior part of diaphragm
- one or both crus may be absent
- aorta & esophagus lie in the gap, but there is no hernial sac

(4) Central Hernia :-

- It is rare
- left sided
- supposed to be the result of rupture of the foetal membranous diaphragm in the region of the left dome

(5) Congenital hiatal hernia :-

- due to persistence of an embryonic peritoneal process in the posterior mediastinum in front of the cardiac end of the stomach
- the stomach can 'roll' - upwards until it lies upside down in the posterior mediastinum
- it is therefore called a 'rolling type' of Hernia
- It is rare
- the normal relationship of the cardio - oesophageal junction to the diaphragm is undisturbed and therefore, the mechanics of the cardio - oesophageal junction usually remains unaltered

(B) ACQUIRED HERNIA :-

(a) Traumatic Hernia - due to bullet injuries of the diaphragm

(b) Hiatal Hernia :-

- or sliding type is the commonest of all internal hernias
- due to weakness of the phrenico-oesophageal membrane which is formed by the reflection of the diaphragmatic fascia to the lower end of the oesophagus
- often caused by obesity or by operation in this area
- the cardiac end can slide up through the hiatus
- the valvular mechanism at the cardio - esophageal junction is disturbed causing reflux of the gastric contents into the oesophagus

118. (b) 6-12mm Hg

(Ref : BDC 4th/e vol. II - pg 271)

Portal pressure :-

Normal pressure in the portal vein is about 5-15mm Hg. It is usually measured by splenic puncture and recording the intrasplenic pressure

Portal hypertension :-

◆ Pressure above 40mm Hg

- ◆ It can be caused by

- (a) Cirrhosis of liver - vascular bed of liver is markedly obliterated
- (b) Banti's disease
- (c) Thrombosis of portal vein

Effects of portal hypertension are :

- (a) Congestive splenomegaly

- (b) Ascites

- (c) Collateral circulation through the portosystemic communications

- It forms

- (1) Caput medusae around umbilicus

- (2) Oesophageal varices at lower end of esophagus

- (3) Hemorrhoids in the anal canal may be responsible for repeated bleeding per rectum

119. (c) Left Renal Vein

(Ref : Gray's 39th/e pg 1047, 1048, 1049)

→ The initial venous channels in the early embryo have traditionally been termed cardinal because of their importance at this stage

→ The cardinal venous complexes are first represented by 2 large veins on each side

→ The pre- cardinal position is rostral to the heart. The post - cardinal position is caudal to the heart

→ The 2 veins on each side unite to form a short common cardinal vein, which passes ventrally, lateral to pleuropericardial canal, to open into the corresponding horn of the sinus venosus

- ◆ The post - cardinal veins → drain the body wall in early embryo, are insufficient to drain developing mesonephros and gonads and for the growing body wall.

- ◆ As the embryo increases in size, they are supplemented by a range of bilateral longitudinal channels that anastomoses with the posterior cardinal system

They are as follows :

- ◆ Subcardinal - assume the drainage of the mesonephros, they intercommunicate by a pre-aortic anastomotic plexus which constitutes the part of left renal vein

- ◆ Supra cardinal - also referred to as thoracolumbar line or lateral sympathetic line

- ◆ Azygos line

- ◆ Subcentral

- ◆ Precostal veins

- ◆ The subcardinal veins are, as indicated, lateral to the aorta and sympathetic trunks, which therefore intervene between them and the azygos lines

- ◆ They communicate caudally with the iliac veins and cranially with the subcardinal veins in the neighborhood of the pre-aortic inter-

- ◆ subcardinal anastomoses
- ◆ The supracardinal veins → communicate through → Azygos lines and subcentral veins.
- ◆ The most cranial of these connections together with the supracardinal - subcardinal and the inter subcardinal anastomoses complete a venous ring around the aorta below the origin of the superior mesenteric artery, termed 'renal collar'.

120. (b) Membranous

(Ref : BDC 4th/e vol. II - pg 349)

Prostatic part of urethra :-

- ◆ 3cm long
- ◆ begins at the internal urethral orifice
- ◆ runs vertically downwards through the anterior part of the prostate
- ◆ it is the widest and the most dilatable part of the male urethra in its middle part, and narrowest where it joins the membranous urethra

Membranous part of urethra :-

- ◆ 1.5 - 2cm long and runs downwards & slightly forwards through the deep perineal space and pierces the perineal membrane about 2.5cm below & behind pubic symphysis
- ◆ With the exception of the urethral orifice, this is the narrowest and least dilatable part of the male urethra
- ◆ It is surrounded by the sphincter urethrae or external sphincter
- ◆ The bulbourethral glands of cooper are placed one on each side of the membranous urethra, although their duct opens into spongy part of the urethra after piercing the perineal membrane
- ◆ The penile / spongy urethra :-
 - 15cm long
 - fixed part which runs forwards & upwards in the bulb of the penis
 - penile urethra is narrow with the uniform diameter of 6mm in the body of penis
 - dilated at commencement - to form the intra bulbar fossa and within the glans penis to form the navicular or terminal fossa.
 - the external urethral orifice is the narrowest part of the male urethra
 - it forms a sagittal slit about 6mm long.

121. (d) Parietal peritoneum

(Ref : BDC 4th/e vol. II - pg 222)

The peritoneum is in the form of a closed sac which is invaginated by a number of viscera. As a result the peritoneum is divided into :

- (1) An outer (or) Parietal layer
- (2) An inner (or) visceral layer
- (1) Parietal peritoneum :-

- lines inner surface of abdominal wall & pelvic walls & lower

- surface of diaphragm
- easily be stripped
- derived from the somatopleural layer of the lateral plate mesoderm
- blood supply and nerve supply are the same as those of the overlying body wall
- because of the somatic innervation, parietal peritoneum is pain sensitive

(2) Visceral Peritoneum :-

- lines the outer surface of viscera, to which it is firmly adherent
- cannot be stripped
- derived from the splanchnopleural layer of the lateral plate mesoderm
- blood supply & nerve supply are the same as those of the underlying viscera
- because of the autonomic innervation, visceral peritoneum evokes pain when viscera is stretched, ischemic, or distended

122. (d) (a) and (c) are true

(Ref : BDC 4th/e vol. II - pg 312)

Diaphragm develops from the following sources :-

- (1) Septum transversum forms the central tendon
- (2) Pleuroperitoneal membranes form the dorsal paired portion
- (3) lateral thoracic wall contributes to the circumferential portion of the diaphragm
- (4) dorsal mesentery of oesophagus forms the dorsal unpaired portion

123. (a) Anteriorly by the stomach, (c) Posteriorly by the pancreas

(Ref : BDC 4th/e vol. II - pg 232, 240)

Lesser sac or omental bursa :-

- ♦ This is a large recess of the peritoneal cavity behind the stomach, the lesser omentum and the caudate lobe of liver
- ♦ It is closed all around, except in the upper part of its right border where it communicates with the greater sac through the epiploic foramen

Borders :-

Anterior wall :-

- (1) Caudate lobe of liver
- (2) Lesser omentum
- (3) The stomach
- (4) The anterior two layers of the greater omentum

Posterior wall :-

- (1) Structures forming the stomach bed
- (2) Posterior layers of greater omentum

Right border

- (1) Reflection of peritoneum from the diaphragm to the right margin of the caudate lobe along the left edge of the inferior vena cava
- (2) The floor of epiploic foramen
- (3) The reflection of peritoneum from the head and neck of the pancreas to the posterior surface of the first part of the duodenum.
- (4) The right free margin of greater omentum where the 2nd & 3rd layer of omentum become continuous with each other

Left border :-

- (1) The gastrophrenic ligament
- (2) The gastrosplenic and lineorenal ligaments enclosing the splenic recess of the lesser sac
- (3) The left free margin of the greater omentum, where again the 2nd & 3rd layers of the greater omentum become continuous

The upper border

By the reflection of the peritoneum to the diaphragm from oesophagus, the upper end of the fissure for the ligamentum venosum & the upper border of the caudate lobe of the liver.

Lower border

Continuation of the 2nd & 3rd layer of the greater omentum at its lower margin

- ◆ However, in adults the part of the sac below the level of the transverse colon is obliterated by the fusion of 2nd & 3rd layers

124. (a) Right kidney

- (b) Hepatic flexure of the colon**
(c) Duodenum

(Ref : BDC 4th/e vol. II - pg 290)

Inferior surface of the liver :-

- ◆ Quadrilateral in shape
- ◆ Directed downwards, backwards and to the left
- ◆ Marked by neighboring viscera as follows
 - (1) Large concave gastric impression
 - also bears a raised area that comes in contact with the lesser omentum - omental tuberosity
 - (2) Fissure for ligamentum teres - represents the obliterated umbilical vein
 - (3) Quadrate lobe - related to
 - lesser omentum
 - pylorus'
 - first part of duodenum
 - (4) Fossa for the gall bladder - to the right of the quadrate lobe
 - (5) Inferior surface of the right lobe bears the colic impression for the hepatic flexure of the colon, the renal impression for the right kidney duodenal impression → second part of duodenum.

125. (d) Penis

(Ref : BDC 4th/e vol. II - pg 214, 215)

- ◆ The superficial fascia of penis consists of very loosely arranged areolar tissue, completely devoid of fat
- ◆ It may contain a few muscle fibres
- ◆ It is continuous with the membranous layer of the superficial fascia of the abdomen above and of the perineum below. It contains the superficial dorsal vein of penis
- ◆ The deepest layer of superficial fascia is membranous and is called the fascia of the penis or deep fascia of penis or Buck's fascia
- ◆ It surrounds all three masses of erectile tissue, but does not extend to the glans
- ◆ Deep to it there are - deep dorsal vein
 - dorsal arteries
 - dorsal nerves of the penis
- ◆ Proximally it is continuous with the dartos and with the fascia of the urogenital triangle

126. (a) Bulb of the penis

- (b) Bulbospongiosus muscle
- (c) Ischiocavernosus muscles
- (d) Superficial transverse perinei muscles

(Ref : BDC 4th/e vol. II - pg 334)

The superficial perineal space of the urogenital region situated superficial to the perineal membrane

Male

Boundaries

- (a) Superficial- Colles fascia
- (b) Deep - Perineal membrane
- (c) On each side - Ischiopubic rami
- (d) Posteriorly - closed by the fusion of perineal membrane with colle's-fascia
- (e) Anteriorly - Open and continuous with the spaces of the scrotum, penis and the anterior abdominal wall

Female

- same
- same
- same
- same

Open and continuous with the spaces of the clitoris and the anterior abdominal wall

Contents :-

- (1) Rest of penis, made up of 2 corpora cavernosa and one corpus spongiosum traversed by the urethra
- Body of clitoris, of 2 corpora cavernosa separated by an incomplete septum. urethral orifice, vaginal orifice, two bulbs of vestibule are there one

on each side of these 2 orifices. These unite and get attached to the glans clitoridis.

Muscles on each side

- (a) Ischiocavernosus covering the corpora cavernosa of penis (a) Ischiocavernosus covering the corpora cavernosa of clitoris

(b) Bulbospongiosus covering corpus spongiosum, both are united by a median raphe (b) Bulbospongiosus covering bulb of vestibule. These remain separated to give passage to urethra & vagina

(c) Superficial transverse perinei (c) Superficial transverse perinei

♦ Bulb of penis is covered by bulbospongiosus

- 127. (a) Conjoint tendon**

- (c) Fascia transversalis**

(Ref : BDC 4th/e vol. II - pg 208)

- ◆ The deep inguinal ring is marked 1.2cm above the midinguinal point, as an oval opening
 - ◆ The superficial inguinal ring is marked immediately above the pubic tubercle as a triangle with its centre 1cm above and lateral to the pubic tubercle

Boundaries :-

- (A) The anterior wall is formed by -

- (B) The posterior wall :-

- In its whole extent : (1) Fascia transversalis
(2) Extraperitoneal tissue
(3) The parietal peritoneum

- In its medial 2/3rds

- (1) Fascia transversalis
 - (2) Extrapерitoneal tissue
 - (3) The parietal peritoneum
 - (1) The conjoint tendon
 - (2) At its medial end by the reflected part of the inguinal ligament
 - (3) Over its lateral one third by the interfoveolar ligament

- (C) Roof: By the arched fibres of the internal oblique and transversus abdominis muscles

- (D) **Floor:** By the grooved upper surface of the inguinal ligament and at the medial end by the lacunar ligament

Structures passing through the canal :

- (1) The spermatic cord in males or the round ligament of the uterus in females, enters through deep ring and passes out through the superficial ring
- (2) The ilioinguinal nerve enters the canal through the interval between the external and internal oblique muscles and passes out through the superficial inguinal ring

Constituents of the spermatic cord :-

- (1) Ductus deferens
- (2) The testicular and cremasteric arteries & the artery of the ductus deferens
- (3) The pampiniform plexus of veins
- (4) Lymph vessels from the testis
- (5) Genital branch of the genitofemoral nerve plexus of sympathetic nerves around the artery to the ductus deferens
- (6) Remains of the processus vaginalis

128. (e) All of the above

(Ref : BDC 4th/e vol. II - pg 348)

Nerve supply of the urinary bladder :

- ◆ Vesical plexus of nerves which is made up of fibres derived from the inferior hypogastric plexus
 - ◆ It contains both sympathetic and parasympathetic components, each of which contains motor or efferent and sensory or afferent fibres
- (1) Parasympathetic efferent fibres or nervi erigentes S2,S3,S4 are motor to the detrusor muscle and inhibitory to the sphincter vesicae.
If these are destroyed normal micturition is not possible
 - (2) Sympathetic efferent fibres (T11 to L2) are said to be inhibitory to detrusor muscle and motor to sphincter vesicae
 - (3) The somatic, pudendal nerve (S2,S3,S4) supplies the sphincter urethrae which is voluntary
 - (4) Sensory nerves : - Pain sensations, caused by distension or spasm of the bladder wall-are carried mainly by parasympathetic and partly by sympathetic nerves.
 - In the spinal cord, pain arising in the bladder passes through the lateral spinothalamic tract and awareness of bladder distension is mediated through the posterior column
 - Bilateral anterolateral cordotomy therefore selectively abolishes pain without affecting the awareness of bladder distension and desire to micturate

Urinary Incontinence :

- ◆ Emptying of the bladder is essentially a reflex function, involving the motor and sensory pathways, involving the motor and sensory

pathways

- ◆ Voluntary control over this reflex is exerted through upper motor neurons, and as long as one pyramidal tract is functioning normally, control of the bladder remains normal
- ◆ Acute injury to the cervical / thoracic segments of the spinal cord leads to a state of spinal shock
- ◆ The muscle of the bladder is relaxed, the sphincter vesicae contracted but sphincter urethrae relaxed
- ◆ The bladder distends and urine dribbles
- ◆ After a few days, the bladder starts contracting reflexly. When it is full, it contracts every 2-4 hours. This is "automatic reflex bladder"
- ◆ Damage to the sacral segments of the spinal cord situated in lower thoracic and lumbar one vertebra results in "autonomous bladder". The bladder wall is flaccid and its capacity is greatly increased. It just fills to capacity & overflows. So there is continuous dribbling.

129. (b) Inferior vena cava**(d) Right lobe of the liver**

(Ref : BDC 4th/e vol. II - pg 306)

Right suprarenal gland

- ◆ Triangular to pyramidal in shape
- ◆ Has
 - an apex
 - a base
 - an anterior and posterior surface
 - an anterior, medial & lateral border

Relations :-

- ◆ Apex - related to the bare area of the liver
- ◆ Base - related to the upper pole of the right kidney

Anterior surface : devoid of peritoneum, except for a small part inferiorly

Related to - IVC medially

- bare area of liver laterally
- occasionally to the duodenum inferiorly

Posterior surface : Right crus of diaphragm

Anterior border - A little below the apex it presents the hilum where the suprarenal vein emerges

Medial border : (1) Right coeliac ganglion
 (2) Right inferior phrenic artery

Lateral border : It is related to the liver

The left suprarenal gland and its parts & their relations

Left suprarenal gland is semilunar :

Upper end : It is related to the posterior end of the spleen

lower end : Near the lower end is the hilum, through which the left suprarenal vein emerges

Anterior surface : From above downwards :-

- (1) The cardiac end of the stomach
- (2) The splenic artery
- (3) The pancreas

Only the gastric impression is covered by peritoneum of the lesser sac

Posterior surface :

- (1) The kidney - laterally
- (2) Left crus of diaphragm - medially

Medial border

- (1) Left coeliac ganglion
- (2) Left inferior phrenic artery
- (3) Left gastric artery

Lateral border : It is related to stomach

130. (e) All of the above

(Ref : Gray's 39th/e pg 1123)

Coeliac Nodes :-

- ◆ They lie anterior to the abdominal aorta around the origin of the coeliac artery
- ◆ They are a terminal group and receive lymph from the regional lymph nodes around the branches of the coeliac artery namely

(1) Left gastric nodes :-

- There are a great number of gastric lymph node groups
- They drain
 - stomach
 - upper duodenum
 - abdominal oesophagus
 - greater omentum

(2) Hepatic : - extend in the lesser omentum along the hepatic arteries & bile duct.

- Vary in number but almost always occur at the junction of the cystic and common hepatic ducts (**cystic node**), along side the upper common bile duct & in the anterior border of epiploic foramen
- Drain - majority of liver, gall bladder and bile ducts, but also receive drainage from some parts of the stomach, duodenum and pancreas

They drain to the coeliac nodes and thence to the intestinal trunks

(3) Pancreatosplenic nodes :-

- drain the spleen, pancreas and part of stomach. Their afferents drain into the coeliac nodes.

131. (a) Nervi Erigentes

(Ref : BDC 4th/e vol. II - pg 391)

Pelvic autonomic nerves :-

Pelvic sympathetic system :-

The pelvic part of the sympathetic chain runs downwards and slightly medially over the body of sacrum and then along the medial margins of the anterior sacral foramina

The two chains unite in front of coccyx to form a small ganglion impar. The chain bears four sacral ganglia on each side & single ganglion impar in the central part

The branches of the chain are :-

- (1) Gray rami communicans to all sacral and coccygeal ventral rami
- (2) Branches to the inferior hypogastric plexus from the upper ganglia
- (3) Branches to the median sacral artery from the lower ganglia
- (4) Branches to the rectum from the lower ganglia
- (5) Branches to the glomus coccygeum from the ganglion impar

The inferior hypogastric plexus

♦ One on each side of the rectum and other pelvic viscera, formed by:-

1. The corresponding hypogastric nerve from superior hypogastric plexus
2. Branches from the upper ganglia of the sacral sympathetic chain
3. The pelvic splanchnic nerves

Branches of the plexus :-

- (1) The rectal plexus
- (2) The vesical plexus
- (3) The prostate plexus
- (4) The uterovaginal plexus

Pelvic splanchnic nerves :-Nervi erigentes :-

- ♦ The nervi erigentes represent the sacral outflow of the parasympathetic nervous system
- ♦ The nerves arise as fine filaments from the ventral rami of S2, S3 and S4
- ♦ They join the inferior hypogastric plexus and are distributed to the pelvic organs
- ♦ Some parasympathetic fibres ascend with the hypogastric nerve to the superior hypogastric plexus and thence to the inferior mesenteric plexus
- ♦ Others ascend independently and directly to the part of the colon derived from the hindgut

132. (a), (b) and (c) are correct

(Ref : BDC 4th/e vol. II - pg 346, 347)

U. Bladder :- When empty it lies entirely within the pelvis but as it fills it expands and extends upwards into the abdominal cavity, reaching up to the umbilicus or even higher.

In infants bladder lies at higher level. The internal urethral orifice lies at the level of the superior border of pubic symphysis. It gradually

descends to reach adult position after puberty

Relations of the urinary bladder :-

- (1) Apex - Connected to umbilicus by median umbilical ligament which represents the obliterated embryonic urachus
 - (2) Base - Female- Uterine cervix
 - Vagina
 Male - Upper part of base separated from rectum by rectovesical pouch containing coils of intestine
 - lower part : separated from rectum by seminal vesicles and the termination of vas deferens
 - The triangular area between the 2 deferent ducts is separated from rectum by the rectovesical fascia of Denonvilliers
 - (3) Neck - Lowest most fixed part
 - Lies 3-4cm behind the lower part of the pubic symphysis (a little above the plane of pelvic outlet)
 - Pierced by internal urethral orifice
 - In males - rests on base of prostate
 - In females - it is related to the pelvic fascia which surrounds the upper part of the urethra.
 - (4) Superior surface - In males - completely covered by peritoneum
 - contact with sigmoid colon
 - coils of terminal ileum
 - In females - peritoneum covers the greater part of the superior surface
 - except for a small area near the posterior border which is related to the supravaginal part of the uterine cervix
 - the peritoneum is reflected to the isthmus of the uterus to form vesicouterine pouch
 - (5) Infero lateral surfaces - In males each surface is related to
 - pubis
 - puboprostatic ligaments
 - retropubic fat
 - levator ani
 - obturator internus
 - In female - relations are same except that the puboprostatic ligaments are replaced by the pubovesical ligaments
- ♦ As the bladder fills, the inferolateral surface form the anterior surface of the distended bladder, which is covered by peritoneum only in its upper part

- ◆ The lower part comes into the direct contact with the anterior abdominal wall, there being no intervening peritoneum
- ◆ This part can be approached surgically without entering the peritoneal cavity

133. (a) Camper's fascia

(Ref : BDC 4th/e vol. II - pg 195)

Superficial fascia :-

Below the level of umbilicus :-

- ◆ The superficial fascia of the anterior abdominal wall is divided into :
 - (a) Superficial fatty layer called **fascia of camper**
 - (b) Deep membranous layer called **fascia of scarpa**
- ◆ The fatty layer is continuous with the superficial fascia of the adjoining part of the body
- ◆ In the penis, it is devoid of fat, and in the scrotum, it is replaced by the dartos muscle
- ◆ The membranous layer is continuous below with a similar membranous layer of superficial fascia of the perineum known as **colle's fascia**
- ◆ The attachments of scarpa's fascia of the abdomen & of colle's fascia of the perineum are such that they prevent the passage of extravasated urine due to rupture of urethra backwards into the thigh.
- ◆ The line of attachment passes over the following
 - (a) Holden's line (begins a little lateral to pubic tubercle and extends laterally for 8cm)
 - (b) Pubic tubercle
 - (c) Body of pubis & the deep fascia on the adductor longus and the gracilis near their origin
 - (d) Margins of the pubic arch
 - (e) The posterior border of the perineal membrane
- ◆ Above the umbilicus the membranous layer fuses with the fatty layer
- ◆ In the median plane, the membranous layer is thickened to form the suspensory ligament of the penis or of the clitoris.

134. (b) Genitofemoral nerve

(Ref : BDC 4th/e vol. II - pg 206)

Rectus sheath :-

This is an aponeurotic sheath covering the rectus abdominus muscle. It has two walls anterior and posterior

Formation of the walls :-

(1) Above the costal margin :

Anterior wall : External oblique aponeurosis

Posterior wall: It is deficient, the rectus muscle rests directly on

the 5th, 6th and 7th costal cartilages**(2) Between the costal margin and arcuate line :**

Anterior wall : (a) External oblique aponeurosis

(b) Anterior lamina of the aponeurosis of the internal oblique

Posterior wall: (a) Posterior lamina of the aponeurosis of internal oblique

(b) Aponeurosis of the transversus muscle

Midway between the umbilicus & the pubic symphysis, the posterior wall of the rectus sheath ends in the arcuate line or linea semicircularis (or) fold of Douglas. The line is concave downwards

(3) Below the arcuate line :-

Anterior wall: All three aponeurosis, through the external oblique aponeurosis is separate, the other two are fused

Posterior wall :Rectus muscle rests on fascia transversalis

Contents :**Muscles**

(1) The rectus muscle

(2) The pyramidalis lies in front of the lower part of rectus abdominis

Arteries

(1) The superior epigastric artery

(2) The inferior epigastric artery

Veins

(1) The superior epigastric vein → internal thoracic vein

(2) The inferior epigastric vein → external iliac vein

Supraumbilical median incisions :

♦ Through the linea alba have several advantages as been bloodless, safety to muscles and nerves but tend to leave a post operative weakness through which a ventral hernia may develop

Infraumbilical median incisions :

♦ Are safer because the close approximation of the recti prevents formation of any ventral hernia.

Paramedian incisions :

♦ Through rectus sheath are more sound than median incisions. The rectus muscle is retracted laterally to protect the nerves supplying it from any injury. In these cases, the subsequent risk of weakness and of incisional or ventral hernia are minimal.

135. (a), (b), (c) are correct

(Ref : BDC 4th/e vol. II - pg 301)

Normal constrictions of ureter are :

The ureter is slightly constricted at three places :-

(1) At the pelviureteric junction

(2) At the brim of the lesser pelvis

(3) At its passage through the bladder wall

Relations of ureter are often asked and are important :-

- (A) Renal pelvis
- (B) Abdominal part of ureter
- (C) Pelvic part of ureter
- (D) Intravesical part

(A) Renal pelvis : - In renal sinus : - branches of renal vessel lie both in front and behind it

Outside the kidney :-

Anteriorly - On (Rt) side

- Renal vessels
- Second part of duodenum
- On (Lt) side
- Renal vessels
- the pancreas
- the peritoneum
- the jejunum

Posteriorly : Psoas major muscle

(B) Abdominal part of ureter :-

Anteriorly : On the (Rt) Side - third part of duodenum

- the peritoneum
- the right colic vessels
- the ileocolic vessels
- the gonadal vessels
- the root of the mesentery
- the terminal part of ileum

On the (Lt) side

- the peritoneum
- the gonadal artery
- the left colic vessels
- the sigmoid colon
- the sigmoid mesocolon

Posteriorly : The ureter lies on

- (1) Psoas major
- (2) The tips of transverse processes
- (3) The genitofemoral nerve

Medially : On the right side - Inferior vena cava

On the left side - The left gonadal vein
- and medially the inferior mesenteric vein

(C) Pelvic part of ureter :

In its downward course :

Posteriorly

- Internal iliac artery
- Commencement of the internal iliac artery
- Internal iliac vein
- lumbosacral trunk

- Laterally
- sacroiliac joint
 - Fascia covering the obturator internus
 - Superior vesical artery
 - Obturator nerve
 - Obturator artery
 - Obturator vein
 - Middle rectal artery
 - In the female, it forms the posterior boundary of the ovarian fossa

In its forward course :-

- In males
- The ductus deferens crosses the ureter superiorly from lateral to medial side
 - The seminal vesicle lies below and behind the ureter
 - The vesical veins surround the terminal part of ureter
- In females
- The ureter lies in the extraperitoneal connective tissue in the lower and medial part of the broad ligament of the uterus
 - The uterine artery lies first above and in front of the ureter for a distance of about 2.5cm and then it crosses it superiorly from lateral to medial side
 - The ureter lies about 2cm lateral to the supravaginal portion of the cervix. It runs slightly above the lateral fornix of the vagina
 - The terminal portion of the ureter lies anterior to vagina

Intravesical part :-

- ◆ The intravesical oblique course of the ureter - valvular action
- ◆ Ureteric openings lie about 5cm apart in a distended bladder and only 2.5cm apart in an empty bladder

136. (b) & (c) are correct

(Ref : BDC 4th/e vol. II - pg 225, 226)

Greater omentum :

- ◆ It is a large fold of peritoneum, made up of four layers of peritoneum all of which are fused together to form a thin fenestrated membrane containing variable quantities of fat like an apron and covers the loops of intestines to a varying extent
- ◆ The part of the peritoneal cavity called the lesser sac between the second and third layers gets obliterated, except for about 2.5cm below the greater curvature of the stomach.

Contents :-

- (1) The right and left gastroepiploic vessels anastomose with each other in the interval between the first two layers of the greater omentum a little below the greater curvature of the stomach

(2) Fat

Functions :-

(1) Storehouse of fat

(2) Protects against infections because of presence of macrophages in it, the collections of which appear to the naked eye as milky spots

(3) Policeman of abdomen - moving to site of infection and sealing it off from surrounding areas.

137. (a), (b) and (e)

(Ref : BDC 4th/e vol. II - pg 234)

Hepatorenal pouch : (Morison's pouch)

Boundaries :-

Anteriorly :

(1) The inferior surface of the right lobe of the liver

(2) The gall bladder

Posteriorly :

(1) The right suprarenal gland

(2) The upper part of right kidney

(3) The second part of duodenum

(4) The hepatic flexure of the colon

(5) The transverse mesocolon

(6) A part of the head of the pancreas

Superiorly : The inferior layer of the coronary ligament

Inferiorly : It opens into the general peritoneal cavity

♦ It is the most dependant (lowest) part of the abdominal cavity proper when the body is supine

♦ It is the commonest site of a subphrenic abscess, which may be caused by spread of infection from the gall bladder, the appendix, or other organs in the region

138. (b) Subcostal nerve

(Ref : BDC 4th/e vol. II - pg 202)

Pyramidalis muscle :

♦ This is a small rudimentary muscle in humans

♦ It arises from the anterior surface of the body of pubis and then the fibres pass upwards and medially to be inserted into linea alba

♦ Supplied by subcostal nerve (T12)

♦ It is said to be a tensor of the linea alba, though the need for such an action is not clear

♦ Rectus abdominis and pyramidalis form the muscular contents of the rectus sheath

139. (b) and (c) are correct

(Ref : BDC 4th/e vol. II - pg 274, 276)

112 Anatomy

- ◆ The cystic artery is the chief source of blood supply distributed to
 - gall bladder
 - cystic duct
 - the hepatic ducts
 - upper part of bile duct
- ◆ Venous drainage :-
 - The superior surface of the gall bladder is drained by veins which enter the liver through the fossa for the gall bladder and join tributaries of hepatic veins
 - The rest of the gall bladder is drained by cystic veins → Liver directly (or) after joining veins draining the hepatic ducts and upper part of the bile duct
 - Rarely - the cystic vein drains into the right branch of the portal vein
 - The lower part of the bile duct drains into the portal vein
 - The gall bladder is divided into :-
 - (1) fundus (2) the body (3) the neck
 - The fundus projects beyond the inferior border of the liver, in the angle between the lateral border of the right rectus abdominis and the ninth costal cartilage
 - No part of gall bladder is described as infundibulum, though the posteromedial wall of the neck is dilated outwards to form a pouch called Hartmann's pouch, which is directed downwards and backwards. Some regard this pouch as a normal feature but others consider it as pathological, as gall stones may lodge in this pouch.

140. (b) L1

(Ref : BDC 4th/e vol. II - pg 264)

- ◆ The superior mesenteric artery arises from the front of the abdominal aorta, behind the body of the pancreas, at the level of vertebra L1, one centimeter below the coeliac trunk
- ◆ The inferior mesenteric arises from the front of the abdominal aorta behind the third part of duodenum at the level of the L3 vertebra, and 3-4 cm above the bifurcation of the aorta
- ◆ The coeliac trunk arises from the front of the abdominal aorta just below the aortic opening of the diaphragm at the level of the disc between vertebrae T12 and L1. It is only 1.25cm long

141. (b) I.V.C

(Ref : BDC 4th/e vol. II - pg 307)

Adrenal glands :-

The naked eye examination of a cross section of the suprarenal gland shows an outer part → cortex (main mass) & an inner part → medulla (1/10 of gland)

The cortex has three zones :-

- (1) Outer zona glomerulosa → mineralocorticoid
- (2) Middle zona fasciculata → glucocorticoids
- (3) Inner zona reticularis → sex hormones
- The medulla - chromaffin cells producing
 - (1) Adrenaline
 - (2) Noradrenaline
 - Autonomic ganglion cells are also seen

Arterial supply :-

- Each gland -
- (1) The superior suprarenal artery
 - branch of inferior phrenic artery
 - (2) The middle suprarenal artery
 - branch of abdominal aorta
 - (3) The inferior suprarenal artery- branch of the renal artery

Venous drainage :

- ♦ Right suprarenal vein → I.V.C
- ♦ Left suprarenal vein → Left renal vein. Lymphatics drain into lateral aortic nodes

142. (d) Transversus fascia

(Ref : BDC 4th/e vol. II - pg 208)

Inguinal canal

- ♦ Oblique passage - lower part of anterior abdominal wall
- ♦ Just above medial half of inguinal ligament
- ♦ Length - 4cm (1.5 inches)
- ♦ From - deep inguinal ring to superficial inguinal ring
- ♦ Deep inguinal ring - an oval opening in **fascia transversalis**
 - 1.2cm above midinguinal point
 - Immediately lateral to stem of inferior epigastric artery
- ♦ Superficial inguinal ring : triangular gap in the external oblique aponeurosis
 - base of triangle - pubic crest
 - 2.5cm long & 1.2cm broad at base

143. (b) Posterior

(Ref : BDC 4th/e vol. II - pg 372)

LOBES OF PROSTATE

- (1) Anterior lobe - Small isthmus connecting the two lateral lobes of the gland
 - No glandular tissue
 - Seldom forms adenoma
- (2) Posterior lobe - Connects the two lateral lobes behind the urethra
 - Behind the median lobe and the ejaculatory

- ducts
- Adenoma never occurs here
- Primary Ca. is said to begin here
- (3) Median lobe
 - (middle / pre-spermatic lobe)
 - Behind the upper part of urethra
 - In front of ejaculatory ducts
 - Just below neck of bladder
 - Produces an elevation in the lower part of the trigone of the bladder known as the **uvula vesicae**
 - Common site for an adenoma
- (4) Lateral lobes
 - On each side of urethra
 - Adenoma may arise in old age

Composition of prostate :

- Central zone
 - 25% glandular substance
- Peripheral zone
 - 75% glandular substance
- Central zone
 - Wedge shaped
 - forms the base of gland with apex at seminal colliculus
 - also surrounds the ejaculatory ducts and its ducts open around the orifice of ejaculatory ducts
 - Benign hypertrophy affects this zone
- Peripheral zone
 - Surrounds the central zone from below and behind but does not reach the base of the gland
 - **This zone is affected by cancer**

- ◆ Valveless communications exists between the prostatic and vertebral plexus through which prostatic carcinoma can spread to the vertebral column and to the skull

True capsule

- Condensation of the peripheral part of the gland
- fibromuscular and is continuous with stroma of gland
- contains no venous plexus

False capsule

- lies outside the true capsule and derived from pelvic fascia
- Anteriorly, continuous with pubo-prostatic ligament
- on each side the prostatic venous plexus is embedded in it
- Posteriorly it is avascular formed by fascia of Denonvilliers

144. (a) The lymph drainage is into the para-aortic (lumbar) lymph nodes at the level of the L1 vertebra
- (b) The ligament of the ovary extends from the ovary to the upper end of the lateral wall of uterus
- (d) The obturator nerve usually lies lateral to the ovary
 (Ref : BDC 4th/e vol. II - pg 353, 354, 355)

OVARIES

Each ovary lies in the ovarian fossa on the lateral pelvic wall. The ovarian fossa is bounded

- (a) Anteriorly - Obliterated umbilical artery
- (b) Posteriorly - Ureter and Internal iliac artery

Position**Nulliparous woman**

- Vertical
- Upper pole (tubal pole) and lower pole (uterine pole)

Multiparous woman

- Horizontal
- Upper pole points laterally
- Lower pole points medially

Relations :-

- (1) The lateral part of the broad ligament of the uterus extending from the infundibulum of the uterine tube and the upper pole of the ovary, to the external iliac vessels, forms a distinct fold known as suspensory ligament of the ovary / infundibulo pelvic ligament

Related to:

- (2) Upper pole
 - uterine tube
 - external iliac vein
 - external ovary may be related to appendix if the latter is pelvic in position
 - ovarian fimbria and the suspensory ligament are attached here

- (3) Lower pole :- - connected to the lateral angle of the uterus posteroinferior to the attachment of the uterine tube, by the ligament of the ovary

- (4) Anterior or mesovarian border - straight & related to - uterine tube
- obliterated umbilical artery
- attached to the back of the broad ligament by mesovarium & forms the hilus of ovary

- (5) Posterior - convex & related to - uterine tube
- ureter

- (6) Lateral surface : related to - ovarian fossa, which is lined by parietal peritoneum
- peritoneum separates the ovary from the obturator vessels & nerve

- (7) Medial surface : Largely covered by the uterine tube
The peritoneal recess between the mesosalpinx and this surface is known as the ovarian bursa.

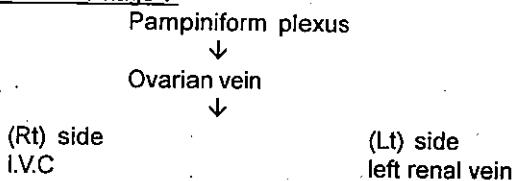
Arterial supply :-

- (1) Ovarian artery - branch of abdominal aorta just below renal artery

- also supplies - uterine tube
 - side of uterus
 - ureter

(2) The uterine artery

Venous drainage :-



Lymphatic drainage :-

Lymphatics from the ovary communicate with the lymphatics from the uterine tube & fundus of the uterus. They ascend along the ovarian vessels to drain into the lateral aortic & pre aortic nodes.

Nerve supply :-

- Sympathetic - T10, T11 → afferent for pain
 → efferent / vasomotor
- Parasympathetic-S2,S3,S4 → Vasodilator

145. (a) Ascending colon

Ref : II / 258, 259

(1) Ascending colon

→ 12.5cm long

- from the caecum to the inferior surface of the right lobe of liver
- usually retroperitoneal

(2) Transverse colon

→ 50cm long

- from the right colic flexure to the left colic flexure
- suspended by transverse mesocolon attached to the anterior border of pancreas

(3) Descending colon

→ 25cm long

- from left colic flexure to the sigmoid colon
- it is narrower than ascending colon
- usually it is retroperitoneal

(4) Sigmoid colon

→ 37.5cm long

- from pelvic brim to the third piece of sacrum, where it becomes rectum
- suspended by sigmoid mesocolon

146. (a) Inguinal nodes

(Ref : BDC 4th/e vol. II - pg 382, 383)

The concept of white line of Hilton & pectinate line :-

The interior of the anal canal shows many important features and is divided into three parts :

- (1) The upper part - 15mm long
- (2) The middle part - 15mm
- (3) The lower part - 8mm
- (1) The upper part - mucous membrane lining
 - endodermal origin
 - 6-10 vertical folds - anal columns of morgagni
 - lower ends of anal columni are united → transverse folds called anal valve
 - above each valve, a depression called anal sinus
 - Anal valves together form a transverse line - all around the anal canal → **Pectinate line**
It is situated opposite the middle of internal anal sphincter, the junction of ectodermal & endodermal parts.
 - Occasionally anal valves show epithelial projections called - anal papillae which are remnants of the embryonic anal membrane

(2) Middle part or transitional zone / pecten :-

- Also lined by mucous membrane
- Anal columns are absent
- A dense venous plexus lies between the mucosa & muscle coat and gives it a bluish discolouration
- Mucosa is less mobile and this region is referred to as pecten / Transitional zone
- The lower limit of the pecten often has a whitish appearance → White line of Hilton
- Hilton's line is situated at the level of the interval between the subcutaneous part of the external anal sphincter and the lower border of internal anal sphincter. It has stratified squamous epithelium, which is thin, pale & glossy & is devoid of sweat glands.

(3) Lower cutaneous part :-

- True skin
- Has sweat glands & sebaceous glands

The lymphatic drainage :-

- ◆ Lymph vessel form the part above the pectinate line, drain with those of the rectum into the internal iliac nodes
- ◆ Vessels from the part below the pectinate line, drain into the medial group of the superficial inguinal nodes

147. (d) Arises from the mesenteric border of ileum

(Ref : BDC 4th/e vol. II - pg 252)

Meckel's Diverticulum (ilei)

- ◆ It is the persistent proximal part of the vitellointestinal duct, present in the embryo, and which normally disappears during the 6th week
- ◆ Points of 2's
 - (1) It occurs in 2% subjects
 - (2) Usually it is 2 inches or 5 cm long
 - (3) It is situated about 2 feet (or) 60cm proximal to the ileocaecal valve, attached to antimesenteric border of the ileum
 - (4) Its calibre is equal to that of ileum
 - (5) Its apex may be free or may be attached to the umbilicus, to the mesentery, or to any other abdominal structure by a fibrous band
 - (6) It may cause intestinal obstruction
 - (7) It may have small regions of gastric mucosa
 - (8) Acute inflammation of the diverticulum may produce symptoms that resemble those of appendicitis
 - (9) It may be involved in other diseases similar to those of the intestine

Differences b/w

<u>Jejunum</u>	<u>Ileum</u>
<ul style="list-style-type: none"> - Villi are tongue shaped - No mucous glands or aggregated lymphoid follicles are present in submucosa 	<ul style="list-style-type: none"> - Villi are few, thin & finger like - Collection of lymphocytes in the form of Peyer's patches in lamina propria extending into the submucosa is a characteristic feature

148. (a) CBD, Hepatic artery, Portal vein

(Ref : BDC 4th/e vol. II - pg 232)

Right border of lesser omentum :-

- ◆ It forms the anterior border of the Epiploic foramen / Foramen of Winslow
- ◆ It contains the portal vein, the hepatic artery and the bile duct

Relation of the bile duct (Ref : BDC 4th/e vol. II - pg 275)

- ◆ Supraduodenal parts in the free margin of lesser omentum
 - Anteriorly - liver
 - Posteriorly - Portal vein & epiploic foramen
 - To the left - Hepatic artery

Relations of the portal vein : (Ref : BDC 4th/e vol. II - pg 269)Supraduodenal part within the free margin of the lesser omentum :-

- ◆ Anteriorly (a) Hepatic artery
 - (b) Bile duct
- ◆ Posteriorly : Inferior vena cava, separated by epiploic foramen

Relation of the common hepatic artery : (Ref : BDC 4th/e vol. II - pg 263)

It runs upwards in the right free margin of the lesser omentum, in front of the portal vein, and to the left of the common bile duct. So it is clear that the relation of common bile duct to common hepatic artery is not anterior to posterior, but medial & lateral, the bile duct being lateral to common hepatic artery, and also that portal vein is a posterior most structure in the contents of the right free margin of lesser omentum

In the options given, since only (a) has portal vein as the posterior most structure, it is the best option

149. (c) i.e. Axillary nodes and inguinal nodes

(Ref : BDC 4th/e vol. II - pg 197, 178 fig 16.8)

Superficial lymphatics :

- ◆ Lymphatics also pay due respect to the water shed line
- ◆ Above the level of the umbilicus the lymphatics run upwards to drain into the axillary lymph nodes
- ◆ Below the level of the umbilicus they run downwards to drain into the superficial inguinal lymph nodes

150. (d) 5 segments

(Ref : BDC 4th/e vol. II - pg 299)

Arterial supply of kidney :-

- ◆ One renal artery on each side
- ◆ Accessory renal arteries are present in 30% individuals, arise commonly from aorta, enter the kidney either at the hilus (or) at one of its poles
- ◆ At hilus - renal artery divides into anterior and posterior division
- ◆ Further branching → Segmental arteries
- ◆ Five segments have been described :
 - (1) Apical
 - (2) Upper
 - (3) Middle
 - (4) Lower
 - (5) Posterior
- ◆ Segmental arteries are end arteries, so that the vascular segments are independent units
- Segmental arteries
 - ↓
 - Lobar arteries
 - ↓
 - 2-3 interlobar arteries
 - ↓
 - At corticomedullary junction arcuate arteries



Interlobular arteries.

- ◆ Afferent glomerular arterioles are derived mostly as side branches from interlobular arteries, but some may arise directly from the arcuate (or) even interlobar arteries.
- ◆ The efferent glomerular arteriole from most of the glomeruli, divides soon to form the peritubular capillary plexus around the proximal and distal convoluted tubules.
- ◆ Since blood passes through two sets of capillaries, glomerulus and peritubular plexus, it forms the renal portal circulation

151. (c) Internal oblique and transversus abdominus

(Ref : BDC 4th/e vol. II - pg 202)

Deep nerves of anterior abdominal wall :

- ◆ Anterior abdominal wall - supplied by
 - T6 - T12 / lower five intercostal & sub costal nerve
 - L1 through iliohypogastric and ilioinguinal branches
- ◆ The lower five intercostal nerves leave the intercostal spaces between the slips of origin of the transversus abdominis and enter the abdominal wall either directly (or) by passing behind the costal cartilages of the seventh, eighth, ninth and tenth ribs
- ◆ They pass between the internal oblique and transversus abdominis, and pierce the posterior lamina of the internal oblique aponeurosis to enter the rectus sheath
- ◆ The subcostal is anterior primary rami of T12 nerve
 - Enter abdomen by passing behind the lateral arcuate ligament of the diaphragm
 - After running in front of the quadratus lumborum, it pierces the transversus abdominis to reach the neurovascular plane

In fig. 16.16 neurovascular plane is shown to lie between transversus abdominis and internal oblique muscles.

152. (c) Cooper's ligament

(Ref : BDC 4th/e vol. II - pg 201, 202)

Extensions :-

- (1) Pectineal part of the inguinal ligament / lacunar ligament :-
 - Triangular & Horizontal
 - Anteriorly - attached to medial end of inguinal ligament
 - Posteriorly - attached to pecten pubis
 - Supports spermatic chord
 - Apex, attached to pubic tubercle
 - Base, directed laterally
 - Forms medial boundary of femoral ring
 - Reinforced by- Pectineal fascia & fibres from linea alba

(2) Pectineal ligament / Cooper's ligament :-

- Extension from posterior part of the base of lacunar ligament
- Attached to pecten pubis. It is thickening in the upper part of the pectineal fascia

(3) The reflected part of the inguinal ligament :-

- Fibres that pass upwards & medially from lateral crus of superficial inguinal ring
- Lies behind the superficial inguinal ring & front of conjoint tendon
- Its fibres interlace with those of the other side at linea alba

153. (b) Latissimus dorsi

(Ref : BDC 4th/e vol. II - pg 297 fig 24.4)

Posterior relations

The posterior surfaces of both kidneys are related to the following :

- (1) The diaphragm
- (2) The medial and lateral arcuate ligaments
- (3) The psoas major
- (4) Quadratus lumborum
- (5) Transversus abdominis
 - The subcostal vessels
 - The subcostal, iliohypogastric and inguinal nerves
 - The right kidney is related to 12th rib
 - The left kidney is related to eleventh and twelfth rib

Anterior relations :-

<u>Left kidney</u>	<u>Right kidney</u>
<ul style="list-style-type: none"> - Left suprarenal gland - Stomach* - Pancreas - Splenic vessels* - Splenic flexure & descending colon - Jejunum* * Covered by peritoneum 	<ul style="list-style-type: none"> - Right suprarenal gland - Liver* - Second part of duodenum - Hepatic flexure of colon - Small intestine* - Lateral border of kidney is related to the right lobe of liver and to the hepatic flexure of colon

154. (b) Splenic artery

(Ref : BDC 4th/e vol. II - pg 286)

Relations of body of pancreas :-**It has 3 borders and 3 surfaces:**

- ♦ Anterior border - provides attachment to transverse mesocolon
- ♦ Superior border - Related to
 - Coeliac trunk
 - Hepatic artery

- Splenic artery to the left
- ♦ Interior border - Superior mesenteric vessels at its right end
- ♦ Anterior surface : forwards & upwards
covered by peritoneum
related to lesser sac & stomach
- ♦ Posterior surface (Bed)- devoid of peritoneum. related to:
 (1) Aorta with origin of superior mesenteric artery
 (2) Left crus of diaphragm
 (3) The left suprarenal gland
 (4) The left kidney
 (5) Left renal vessels
 (6) Splenic vein

Inferior surface : Covered by peritoneum & related to
 (1) Duodenojejunal flexure
 (2) Coils of jejunum
 (3) Left colic flexure

155. (b) Renal fascia

(Ref : Gray's 39th/e pg 1270)

Perirenal fascia :-

The perirenal fascia is a dense, elastic connective tissue sheath which envelops each kidney and supra renal gland together with a layer of perirenal fat, which is thickest at renal borders, and prolonged at the hilum into the renal sinus.

The perirenal fascia was originally described as being made up to two separate entities, the posterior fascia of zuckerkandl and anterior fascia of gerota which fused laterally into lateral renal fascia

156. (a) Anterior division of internal iliac artery

(Ref.: BDC 4th/e vol. II - pg 387)

Internal iliac artery :-

- ♦ Branch of common iliac artery
- ♦ 3.75cm long
- ♦ In foetus, internal iliac artery is double the size of the external iliac artery because it transmits blood to placenta through umbilical artery
- ♦ After birth, the proximal part of umbilical artery persists to form the first part of superior vesical artery, and the rest of it degenerates into a fibrous cord, the medial umbilical ligaments :

Anterior division

6 branches

- (1) Superior vesical
- (2) Obturator

Posterior division

- (1) Iliolumbar
- (2) Two lateral sacral
- (3) Superior gluteal arteries

- (3) Middle rectal
- (4) Inferior vesical
- (5) Inferior gluteal
- (6) Internal pudendal
In females Inferior vesical replaced by vaginal artery
- (7) Uterine artery

157. (d) None

(Ref : Gray's A 39th/e pg 952,953)

- ◆ Manubrium is level with the third & fourth thoracic vertebra
- ◆ The body is level with the fifth to ninth thoracic vertebra
- ◆ (Pg 945) - Xiphisternal joint & xiphoid process may be felt at the inferior end of the sternum. The joint usually lies at the level of the ninth thoracic vertebra
- ◆ The umbilicus in the supine position, lies at the level of the disc between the third & fourth lumbar vertebra. The bifurcation of aorta then lies 2cm caudal to umbilicus. In erect position, in children and in obese or individuals with pendulous abdomen, the umbilicus may lie at lower level.
- ◆ Aortic aperture of diaphragm → lowest & most posterior - at level of the lower border of T12 vertebra
- ◆ Oesophageal aperture - T10 vertebra
- ◆ Vena caval aperture - highest - at level of disc between T8 and T10 vertebrae

158. (a) Lt. transverse process of L2 to Rt. sacroiliac joint

(Ref : BDC 4th/e vol. II - pg 227)

Mesentery :-

- ◆ The mesentery of the small intestine (or) mesentery proper is a broad, fan-shaped fold of peritoneum which suspends the coils of jejunum and ileum from the posterior abdominal wall

Root of mesentery

- 15cm long
- directed obliquely downwards and to the right
- It extends from the duodenojejunal flexure on the left side of vertebra L2 to the upper part of the right sacroiliac joint
- It crosses the following :
 - (1) Third part of duodenum where the superior mesenteric vessels enter into it
 - (2) The abdominal aorta
 - (3) The inferior vena cava
 - (4) The right ureter
 - (5) The right psoas major

The free or intestinal border is 6meter long, thrown into pleats.

159. (b) Lesser omentum

(Ref : BDC 4th/e vol. II - pg 224)

- ◆ The abdominal part of the foregut is suspended by mesenteries both ventrally & dorsally
- ◆ The ventral mesentery of the foregut is called the ventral mesogastrium, the dorsal mesentery is called the dorsal mesogastrium
- ◆ The ventral mesogastrium

divided by developing liver

Ventral part

Forms ligaments of liver

- The falciform ligament
- The right and left triangular ligaments
- The superior & inferior layers of the coronary ligament

Dorsal part

- Lesser omentum

Fate of dorsal mesogastrium

(1) The greater / caudal part → greater omentum

(2) Cranial part

divided by developing spleen

Dorsal part

- Lienorenal ligament

Ventral parts

- Gastroplenic ligament

(3) Cranial most part → gastro phrenic ligament

160. (c) Is shorter than in male

(Ref : BDC 4th/e vol. II - pg 350)

- ◆ The female urethra is only 4cm long and 6mm in diameter
- ◆ Developmentally, it corresponds to the upper part of the prostatic urethra of the male, the part that lies above the opening of prost- atic utricle
- ◆ In cross - section, the female urethra is crescentric in upper part, stellate in middle and transverse in lower part
- ◆ External urethral orifice is a sagittal slit with two lips
- ◆ Female urethra is easily dilatable, catheters and cystoscopes can be easily passed through it (that does not mean we do not use local anesthesia)

161. (c) Foregut & mid gut

(Ref : BDC 4th/e vol. II - pg 224)

Foregut forms

- Oesophagus

- The stomach

- Upper part of duodenum upto the opening of common bile duct

Midgut forms	<ul style="list-style-type: none"> - Rest of the duodenum - Jejunum - The ileum - The appendix - The caecum - The ascending colon - The right two - thirds of transverse colon
Hindgut forms	<ul style="list-style-type: none"> - Left one third of transverse colon - The descending colon - The sigmoid colon - Proximal upper part of the rectum

162. (d) Nerve supply from coeliac plexus

(Ref : BDC 4th/e vol. II - pg 280, 224 for c, 282 for d)

- ◆ The spleen lies obliquely along the long axis of the 10th rib
- ◆ It is directed downwards, forwards & laterally making an angle of 45° with the horizontal plane
- ◆ The superior border is characteristically notched near the anterior end
- ◆ Inferior border is rounded, intermediate border is also rounded and is directed to the right
- ◆ Spleen develops in the cephalic part of dorsal mesogastrium, from its left layer, during sixth week of intrauterine life, into a number of nodules which soon fuse to form a lobulated spleen.

◆ Nerve supply :-

Sympathetic fibres are derived from the coeliac plexus. They are vasoconstrictor in nature. They also supply some smooth muscle present in the capsule.

163. (d) On the side of rectum

(Ref : BDC 4th/e vol. II - pg 322, 323)

- ◆ There are 2 plexuses, right & left
 - ◆ Lies in the extraperitoneal connective tissue of pelvis
- | Male | Female |
|---|---|
| <ul style="list-style-type: none"> - On the side of rectum - The seminal vesicle - The prostate - Posterior part of urinary bladder | <ul style="list-style-type: none"> - On the side of rectum - The cervix - The vaginal fornix - Posterior part of urinary bladder - Extends into base of the broad ligament of the uterus |

The fibres forming inferior hypogastric plexus :-

Sympathetic Nerves (T10 to L2)

- ◆ Derived chiefly from hypogastric nerve
- ◆ A few fibres from sympathetic ganglia

Parasympathetic Nerves (S2,S3,S4)

- ◆ Derived from pelvic splanchnic nerves
- ◆ They relay in walls of the viscera supplied

164. (b) Genital branch of genitofemoral nerve

Innervation of cremaster muscle : (Gray's 39th/ed pg 1109)

Cremaster is innervated by the genital branch of genitofemoral nerve, derived from the first & the second lumbar spinal nerves

- ◆ Stroking the skin of the medial side of the thigh evokes a reflex contraction of the muscle, the cremasteric reflex most pronounced in children
- ◆ (Pg 371/ Snells Neuroanatomy 4th ed) This reflex arc passes through the first lumbar segment of the spinal cord
- ◆ This reflex is dependent on the integrity of the corticospinal tracts, which exert tonic excitatory influence on the internuncial neurons

165. (a) Left gastric artery, (b) Short gastric artery

(e) Lt. gastroepiploic artery

(Ref: BDC 4th/e vol. II - pg 241)

This is a very important question in the context of both anatomy and surgery as well

The stomach is supplied by :-

- (1) Left gastric artery - branch of coeliac trunk
- (2) The right gastric artery - branch of common hepatic artery
- (3) The right gastroepiploic artery - branch of gastroduodenal artery
- (4) The left gastro epiploic artery - branch of splenic artery
- (5) 5 - 7 short gastric artery - branches of splenic artery

Peptic ulcer - occur at sites of pepsin and HCl, namely stomach, first part of duodenum, lower end of esophagus and Meckel's diverticulum

Duodenal ulcer - Anterior perforates and posterior bleeds because of its relation to the gastroduodenal artery

166. (d) Inferior mesenteric vein

(Ref: BDC 4th/e vol. II - pg 235)

Peritoneal fossae (Recesses)

- ◆ These are small pockets of the peritoneal cavity enclosed by small, inconstant folds of peritoneum
- ◆ They commonly occur at the transitional zones between the absorbed and unabsorbed parts of the mesentery

- ◆ These are best observed in foetuses, and are mostly obliterated in adults. Sometimes they persist to form potential sites for internal hernia and their strangulation.

Classification

- | | | |
|---------------------|--------------------|-------------------|
| (1) Duodenal Fossae | (2) Lesser sac | (3) Caecal fossae |
| (or) Recess | - (largest recess) | |
| | - always present | |

(1) Duodenal fossae :-

(1) Superior duodenal recess

- Present in 50% subjects
- At level of L2 vertebra
- 3cm deep
- orifice looks downwards

(2) Inferior duodenal recess

- present in 75% subjects
- L3 vertebra level
- 3 cm deep
- Orifice looks upwards

(3) Paraduodenal recess :-

- Present in 20% subjects
- Inferior mesenteric vein lies in the free edge of the peritoneal fold
- Orifice looks to the right

(4) Retroduodenal recess :-

- Occasionally present
- Largest of duodenal recesses
- 8 to 10 cm deep
- Orifice looks to the left

(5) Duodenojejunal / mesocolic recess :-

- Present in 20% of subjects
- 3cm deep
- Orifice looks downwards & to the right

(6) Mesentriocaparital fossa of waldeyer :-

- In 1% subjects
- Lies behind upper part of the mesentery
- The superior mesenteric vessels lie in the fold of the peritoneum covering this fossa

(3) CAECAL FOSSAE

128. Anatomy

- (1) Superior ileocaecal recess :-
 - commonly present
 - formed by a vascular fold present between the ileum and the ascending colon
 - orifice looks downwards & to left

- (2) Inferior ileocaecal recess :-
 - is covered by the fold of treves
 - orifice - downwards & to left

- (3) Retrocaecal recess :-
 - behind caecum
 - often looks downwards

The Intersigmoid recess

- ◆ Constantly present in the foetus & early infancy
- ◆ May disappear with age
- ◆ Lies behind apex of sigmoid mesocolon
- ◆ Orifice looks downwards

167. (d) Synarthrosis

(Ref : Gray's 39th/e pg 952)

Unlike all other sternocostal joints, the manubriocostal joint (between the manubrium and the first costal cartilage) is an unusual form of synarthrosis

168. (b) Marginal artery

(d) Sigmoid artery

(Ref : BDC 4th/e vol. II - pg 266, 267)

Sigmoid arteries or inferior left colic arteries :

- ◆ 2-4 in number
- ◆ downward & left to anastomose with each other and to form lower part of the marginal artery
- ◆ upper most branch → descending branch of left colic artery
- ◆ lower most branch → superior rectal artery
- ◆ supply the descending colon in iliac fossa & sigmoid colon

The marginal artery :-

- ◆ Described by von heller in 1803, present name given by sudeck 1907
- ◆ The marginal artery is an arterial arcade situated along the concavity of the colon formed by anastomoses between the main arteries supplying the colon, namely the
 - ileocolic
 - right colic
 - left colic

- sigmoid arteries
- ◆ Lies at a distance of 2.5 to 3.8cm from the colon
- ◆ Closest to the colon in its descending & sigmoid parts
- ◆ Vasa recta arise from it & supply the colon
- ◆ The marginal artery is capable of supplying the colon even in the absence of one of the main feeding trunks, a fact utilized in surgery. However at the junctional points between the main vessels, there may be variations in the competence of the anastomoses.

169. (a) Completely lined by stratified squamous epithelium

(Ref : BDC 4th/e vol. II - pg 381, 382, 383)

- ◆ The upper 15mm and middle 15mm of the anal canal is lined by mucous membrane, and only the lower 8mm of it is lined by true skin containing sweat glands & sebaceous glands
- ◆ Nerve supply of anal canal
 - (1) Above the pectinate line
 - Sympathetic - Inferior hypogastric plexus - L1 & L2
 - Parasympathetic - pelvic splanchnic S2,S3,S4
 - Pain is carried by both of them
 - (2) Below the pectinate line
 - somatic
 - Inferior rectal S2,S3,S4 - nerves
 - (3) Sphincters - Internal sphincter - contraction - sympathetic nerve / relaxation - parasympathetic. N
External sphincter - inferior rectal nerve & by perineal branch of 4th sacral. N

Gray's A 49th/e pg 1364 :-

Pudendal N.

- ◆ Arises from the ventral divisions of the second, third & fourth sacral ventral rami (S2, S3, S4)
- ◆ It accompanies the internal pudendal artery through the lesser sciatic foramen into the pudendal (Alcock's) canal on the lateral wall of the ischioanal fossa
- ◆ In the posterior part of the canal it gives rise to the **inferior rectal nerve**, the **perineal nerve** and the **dorsal nerve of penis (or) clitoris**

Venous drainage :-

- (1) Internal rectal venous plexus / hemorrhoidal plexus lies in the submucosa of the anal canal
 - drains - into superior rectal vein
 - communicates freely with the external plexus & thus with the middle & inferior rectal veins

The internal plexus, an important site of communication between the portal & systemic veins

Arterial supply of anal canal

Above the pectinate line :- Superior rectal artery

Below the pectinate line :- Inferior rectal artery

170. (d) Large circular mucosal folds

(Ref : BDC 4th/e vol. II - pg 251, 252)

Differences between jejunum & ileum

<u>Features</u>	<u>Jejunum</u>	<u>Ileum</u>
(1) Location	Occupies upper & left parts of intestinal area	Occupies lower & right parts of intestinal area
(2) Walls	Thicker and more vascular	Thinner and less vascular
(3) Lumen	Wider and often empty	Narrower and often loaded
(4) Mesentery	(a) Windows present (b) Fat less abundant (c) Arterial arcades, 1 or 2 (d) Vasa recta longer & fewer	(a) No windows (b) Fat more abundant (c) Arterial arcades, 3/6 (d) Vasa recta shorter & more numerous
(5) Circular mucosal folds	Larger and more closely set	Smaller and sparse
(6) Villi	Large, thick (leaf like) and more abundant	Shorter, thinner (finger-like) and less abundant
(7) Peyer's patches	Absent	Present
(8) Relatively lymphatic follicles	Fewer	More numerous

171. (a) Posterolateral gap in diaphragm

(Ref : Gray's A 39th/e pg 1083)

Abdominal organs, usually the stomach, may herniate through the diaphragm into the thorax. There are three sites at which such hernias can occur :

- (1) Posterolateral (Bochdalek)
- (2) Subcosto sternal (Morgagni)
- (3) Oesophageal

The most common is a posterolateral Bochdalek hernia, which occurs as a result of a defect in the posterior diaphragm in the region of the tenth or eleventh ribs, more common on the left and presents with abdominal contents in the left hemithorax at birth. clinically

significant cases develop hypoxaemia and respiratory failure at birth.

172. (d) Pudendal nerve

(Ref : BDC 4th/e vol. II - pg 383)

- ◆ The anal veins are arranged radially around the **anal margin** and they communicate with the internal rectal plexus and inferior rectal veins
- ◆ Excessive straining during the defecation may rupture one of these veins, forming a sub cutaneous perianal hematoma known as external piles
- ◆ The **anal margin is below the pectinate line** and the part of anal canal below pectinate line is supplied by somatic (inferior rectal S2,S3,S4) nerves, which is one of the branches of pudendal nerves.

173. (a) Bile duct

(b) Hepatic artery

(d) Portal vein

(Ref : Gray's Anatomy 39th/e pg 1216)

- ◆ "The liver has four lobes or eight segments depending on whether it is defined by its gross anatomical appearance or by its internal architecture
- ◆ Classification of the liver by internal architecture divides it into lobes, segments (or) sectors
- ◆ The biliary, hepatic arterial and portal venous supply of the liver tend to follow very similar distributions used to define the hepatic segments
- ◆ The hepatic venous anatomy follows a markedly different pattern
- ◆ The value of the segmental classification, according to vascular and biliary supply is that surgical resection of a segment, multiple segments or a whole lobe, may be planned and performed to encounter fewest possible major vascular structures".

174. (c) L4, L5 Nerve roots

(Ref : Gray's Anatomy 39th/e pg 751)

- ◆ Sacral canal is formed by sacral vertebral foramina
- ◆ triangular in section
- ◆ Each lateral wall presents 4 intervertebral foramina, through which the canal is continuous with pelvic and dorsal sacral foramina
- ◆ Its caudal opening is the sacral hiatus
- ◆ The canal contains the - cauda equina
 - the filum terminale
 - the spinal meninges
- ◆ The fifth sacral spinal nerves also emerge through the hiatus medial to the sacral cornua & groove the lateral aspects of the 5th sacral vertebra.

- ◆ (Gray's A 39th/e pg 729) -The dural sac (the ca), and thus the subarachnoid space and its contained C.S.F, (S2)usually extends to the level of the second segment of the sacrum. This corresponds to the line joining the sacral dimples located in the skin over the posterior superior iliac spines

Gray - 739

Veins of the vertebral column form intricate plexuses along the entire column, external & internal to the vertebral canal

175. (a) Wolffian duct

(Ref : BDC 4th/e vol. II - pg 366)

Development of female reproductive system :-

Comprises of

- (1) Two ovaries
- (2) Genital ducts
- (3) External genitalia

Ovary :-

Various components & their derivations :-

- (a) germ cells - migrated from dorsocaudal end of yolk sac
- (b) follicular cells - from epithelial cells of coelomic epithelium
- (c) stromal cells - derived from mesoderm
- ◆ No tunica albigenia in ovary and cortical part of gonad predominates

Ducts :-

In female :-

- ◆ Mullerian (or) paramesonephric duct predominates
- ◆ This duct is lateral to mesonephric duct
- ◆ Opens caudally into definitive urogenital sinus
- ◆ Mullerian ducts proliferate due to presence of oestrogens and absence of testosterone and mullerian inhibiting substance
- ◆ Distal part of the two ducts fuse to form the single uterovaginal canal which gives rise to uterus with its fundus, body and cervix parts
- ◆ Wolffian duct / Mesonephric duct forms trigone of urinary bladder as functional component. Duct of gartner is its vestigeal component

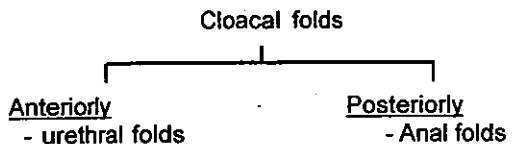
Epoophoron :

- ◆ 10-15 parallel tubules between the ovary & uterine tubes, which end in a longitudinal duct
- ◆ These tubules represent cranial mesonephric tubules while the duct is a remnant of mesonephric duct / wolffian duct

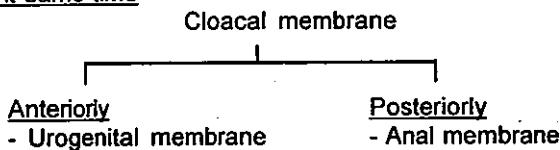
External genitalia :-

- ◆ Mesenchymal cells migrate around cloacal membrane forming

cloacal folds, which fuse ventrally forming genital tubercles



At same time



- ◆ Lateral to urethral folds - appear another pair of genital folds
- ◆ Genital tubercle forms - clitoris
- urethral folds forms - labia minora
- genital swelling form - labia majora
- urogenital membrane gets ruptured to form the vestibule

Lower limb

Questions

176. Patella completely ossifies by the age of - (PGI 04)

- a. 6 years
- b. 10 years
- c. 14 years
- d. 21 years

177. Fibella is (PGI 81, AMU 87)

- a. Same as fibula
- b. An accessory projection from fibula
- c. A sesamoid bone
- d. None of above

178. Peroneus brevis is inserted to (PGI 88)

- a. Base of fifth metatarsal
- b. Base of first metatarsal
- c. Head of third metatarsal
- d. Head of second metatarsal

179. The ischial tuberosity gives attachment to - (AIIMS 79, Rohtak 90)

- a. Obturator internus
- b. Quadratus femoris
- c. Gluteus maximus
- d. Adductor magnus

180. The posterior division of obturator nerve innervates (AIIMS 79, Kerala 89)

- a. Hip joint
- b. Knee joint
- c. Adductor longus
- d. Pectineus

- 181. In the region of the knee - (PGI 81)**
- a. The popliteal fossa is bounded above by tendons of the hamstring muscles and below by two heads of the gastrocnemius muscle
 - b. The deepest structure in the popliteal fossa is the popliteal artery
 - c. The popliteal and femoral vessels are continuous through the adductor hiatus
 - d. The common peroneal nerve passes superficially through the central portion of popliteal fossa
- 182. The superficial circumflex iliac artery usually anastomoses with which of the following arteries (AIIMS 81, AMC 83)**
- a. Superior gluteal
 - b. Lateral femoral circumflex
 - c. Deep circumflex iliac
 - d. All of the above
- 183. The longitudinal arch of the foot (PGI 82)**
- a. Is divided into medial and lateral portions anteriorly with the calcaneous forming a common component posteriorly
 - b. Is highest (most superior) at the level of the talus
 - c. Receives medial support primarily from the plantar calcaneonavicular (spring) ligament, which directly supports the head of the talus
 - d. Is arranged so that weight is distributed anteriorly to the heads of the metatarsals and posteriorly to the calcaneus
- 184. The following muscles dorsiflex the foot at ankle joint : - (PGI 82)**
- a. Extensor digitorum brevis
 - b. Tibialis anterior
 - c. Peroneus longus
 - d. Extensor hallucis longus
- 185. The contents of the femoral sheath is / are (AIIMS - 84)**
- a. Femoral nerve
 - b. Femoral vein
 - c. Femoral artery
 - d. b & c
- 186. The following structures pass through the subsartorial canal except the (AIIMS 85)**
- a. Posterior division of the obturator nerve
 - b. Saphenous nerve
 - c. Femoral artery
 - d. Nerve to vastus intermedius
 - e. Femoral vein

136 Anatomy

- 187. Knee jerk reflex tests : (NIMHANS 86, 87, Kerala 87)**
- a. L1,L2,L3
 - b. L2,L3,L4
 - c. L3,L4,L5
 - d. L4,L5,S1
 - e. L5,S1,S2
- 188. Femoral nerve does not supply (AIIMS 86, 91)**
- a. Sartorius
 - b. Rectus femoris
 - c. Tensor fascia lata
 - d. Articularis genu
- 189. Which is true of spring ligament (TN 87)**
- a. Seen in the spine
 - b. Synonymous with plantar calcaneonavicular ligament
 - c. Seen in knee joint
 - d. Seen in hip joint
- 190. The action of popliteal muscle is to (PGI 87)**
- a. Rotate the femur laterally on the tibia
 - b. Rotate the femur medially on the tibia
 - c. Rotate the tibia laterally on the femur
 - d. Rotate the tibia medially on femur
- 191. Foot drop results as an injury to (AI 88)**
- a. Deep peroneal nerve
 - b. Superficial peroneal nerve
 - c. Tibial nerve
 - d. Deltoid ligament
- 192. Lateral rotators of Hip are all except : (AI 88)**
- a. Piriformis
 - b. Quadratus femoris
 - c. Obturator internus
 - d. Obturator externus
 - e. Psoas major
- 193. The strongest ligament in the body is (PGI 88)**
- a. Inguinal ligament
 - b. Lacunar ligament
 - c. Ligamentum flavum
 - d. Iliofemoral ligament

194. Housemaid's knee is an inflammation of the (UPSC 89)
- a. Suprapatellar
 - b. Semi membranosus
 - c. Prepatellar
 - d. Lateral patellar
195. Medial meniscus is attached at (NIMHANS 89)
- a. One point
 - b. Two points
 - c. Three points
 - d. None
196. Which of the following muscles does not arise from calcaneum (AP 91)
- a. Flexor digitorum brevis
 - b. Extensor digitorum brevis
 - c. Flexor hallucis brevis
 - d. Abductor hallucis
197. The major blood supply to the posterior femoral muscles is provided by - (AP 91)
- a. The perforating branches of the deep femoral artery
 - b. The obturator artery
 - c. The superior gluteal artery
 - d. Medial and lateral femoral circumflex vessels
198. Which of the following muscles does not insert into the plantar aspect of the foot (UP 92)
- a. Flexor digitorum longus
 - b. Peroneus tertius
 - c. Peroneus longus
 - d. Tibialis posterior
 - e. Flexor hallucis longus
199. Oblique popliteal ligament is the continuation of (AI 92)
- a. Semitendinosus
 - b. Semimembranosus
 - c. Biceps femoris
 - d. Adductor magnus
200. The nerve involved in Tarsal tunnel syndrome is (AI 93)
- a. Lateral plantar
 - b. Medial plantar
 - c. Posterior tibial
 - d. Anterior tibial

201. Great saphenous vein can be exposed anterior to the medial malleolus at (AMU 92)
- a. 1cm
 - b. 1.25cm
 - c. 2.5cm
 - d. 4 cm
202. Drainage of glans penis is to (AI 95)
- a. Deep inguinal nodes
 - b. Superficial inguinal nodes
 - c. Paraaortic
 - d. Iliac lymph nodes
203. While flexing knee, femoral condyles are prevented from rolling backwards by (AIIMS 95)
- a. Ligamentum patellae
 - b. Semilunar cartilages
 - c. Medial and lateral collateral ligaments
 - d. Cruciate ligaments
204. Muscles inserted into the iliotibial tract (CUPGEE 96)
- a. Tensor fasciae lata
 - b. Gluteus maximus
 - c. Vastus lateralis
 - d. All
205. Anterior cruciate ligament is attached to (JIPMER 98)
- a. Medial part of anterior intercondylar area of tibia
 - b. Lateral part of medial condyle of femur
 - c. Lateral part of lateral condyle of femur
 - d. Medial part of lateral condyle of femur
206. In children, the head of femur is supplied by all of the following arteries except - (ICS - 98)
- a. Nutrient artery
 - b. Medial circumflex artery
 - c. Artery of ligamentum teres
 - d. Obturator artery
207. Abnormal obturator artery is a branch of (Orissa 99)
- a. Internal iliac artery
 - b. External iliac artery
 - c. Obturator artery
 - d. Inferior epigastric artery

208. Trendelenberg's sign is positive with weakness / paralysis of (TN 2001)
- Gluteus maximus
 - Gluteus medius & minimus
 - Adductor longus
 - Hamstrings
209. A 10year old boy taken for venesection of great saphenous vein developed sudden pain and paraesthesia on the medial aspect of great toe after giving incision over the vein & ligating it. Which of the following nerve is mostly likely involved in this (AI 2002)
- Sural nerve
 - Deep peroneal nerve
 - Medial plantar nerve
 - Saphenous nerve
210. The lymphatic drainage form heel and lateral part of foot is to (JIPMER 2002)
- Superficial inguinal lymph node
 - Deep inguinal L.N
 - External iliac L.N
 - Popliteal L.N
211. Biceps femoris, true is (TN 2002)
- Muscles of adductor compartment of thigh
 - Attached to head of fibula
 - Supplied by femoral nerve
 - Related to medial ligament of knee
212. Which one of the following structures passes out of the pelvis through the greater sciatic notch and re-enters through the lesser sciatic notch (UPSC 02)
- Ureter
 - Obturator nerve
 - Internal pudendal artery
 - Middle rectal artery
213. A commonest cause for neuralgic pain in foot is - (AI 03)
- Compression of communication between medial and lateral plantar nerves
 - Exaggeration of longitudinal arches
 - Injury to deltoid ligament
 - Shortening of plantar aponeurosis

214. All of the following ligaments contribute to the stability of ankle (Talocrural) joint except - (AIIMS 03)

- a. Calcaneonavicular (spring) ligament
- b. Deltoid ligament
- c. Lateral ligament
- d. Posterior tibiofibular

215. Which of the following invertors is inserted on almost all the tarsal bones except talus (Kerala 04)

- a. Tibialis anterior
- b. Tibialis posterior
- c. Flexor hallucis longus
- d. Flexor digitorum longus

Lower limb

Answers

176. (c) 14 years

(Ref : BDC 4th/e, vol II - pg 23)

Bone	Appearance of centres	Fusion
------	-----------------------	--------

(1) Patella 3-6 years of age Puberty i.e 13-14 years of age

one primary & 1st upper epiphyses

4 secondary centres 2nd lesser trochanter

Primary centre : 3rd greater trochanter

7th week of 4th head fuse with shaft at

Intrauterine life 18years of age

Secondary centres : lower epiphysis 20th year

Lower end - 9th month of Presence of the centre of lower

Intrauterine life end of femur in a newly born

Head - 6months of life child indicates that

greater trochanter - the child was viable

4th year

lesser trochanter -

12th year

(3) Hip Bone 3 primary centres: Ischiopubic rami

Ossifies in (i) ilium - 2nd mt of I.u. life fuse - 7-8 yrs of age

cartilage (ii) ischium - 4th mth of I.u. life Acetabulum

 (iii) pubis - 5th mth of I.u. life 16-17yrs of age

At birth the hip bone is ossified

except

for three cartilaginous parts:

i) iliac crest

ii) a Y-shaped cartilage separating the
ilium, ischium and pubis

iii) a strip along the inferior margin of the
bone including the ischial tuberosity

5 secondary centres:

appear at puberty

- 2 - for iliac crest

- 2 - for Y shaped cartilage

- 1 - for ischial tuberosity

(4) Tibia One primary centre Upper end fuses with shaft at

- in shaft - 7th week of

I.U. life

16-18yrs

Lower end fuses with shaft at

15-17 yrs

2 secondary centres

- (i) upper end - just before birth
 (ii) lower end - during 1st year
 forms medial malleolus by 7th year

(5) Fibula

1 Primary centre :

Shaft - 8th week of I.u. life

Lower end fuses with

shaft at 16yrs

Upper end fuses with
shaft at 18yrs2 secondary centres :

(i) lower end : during 1st year

(ii) upper end : during 4th year

Fibula violates the law of ossification because :-**The secondary centre which appears first in lower end does not fuse last****The reasons for this violation are :-**

- (1) The secondary centre appears first in the lower end because it is a pressure epiphysis
- (2) The upper epiphysis fuses last because this is the growing end of the bone

177. (c) A sesamoid bone

(Ref : BDC 4th/e, vol II - pg 113)

- ◆ Soleus is homologous with flexor digitorum superficialis of the front of the forearm
- ◆ Long plantar ligament is the divorced tendon of the gastrocnemius
- ◆ Flexor digitorum brevis is the divorced distal part of the soleus
- ◆ A small sesamoid bone called the **fabella** is present in the tendon of origin of the lateral head of gastrocnemius
- ◆ Brodie's Bursa lies deep to the medial head of gastrocnemius, also deep to semimembranosus & may communicate with the cavity of the knee joint
- ◆ The soleus is, sometimes called the peripheral heart
- ◆ **The tendocalcaneous is the thickest & strongest tendon of the body**

178. (a) Base of fifth metatarsal.

(Ref : BDC 4th/e, vol II - pg 106)

<u>Muscle</u>	<u>Origin</u>	<u>Insertion</u>
(1) Peroneus longus	(a) Head of fibula, sometimes the adjoining part of the lateral condyle of the tibia (b) Upper 1/3rd & posterior 1/2 of middle 1/3rd of lateral surface of shaft of fibula	(a) Lateral side of base of first (1st) metatarsal bone

- (2) Peroneus brevis (a) Anterior 1/2 of the middle 1/3rd & the lower 1/3rd of the lateral surface of the shaft of fibula
 b) anterior and posterior intermuscular septa of the leg
- Inserted into the lateral side of the base of the (5th) metatarsal fifth bone

Nerve supply :-

- ◆ Superficial peroneal nerve
- ◆ It is a smaller terminal branch of the common peroneal nerve

Actions :-

- (1) Peroneus longus and brevis are everters of foot when the foot is off the ground
- (2) Along with other inverter muscles present around the ankle, the peronei help to maintain the stability of the joint
- (3) The peroneus longus helps to maintain the lateral longitudinal arch and transverse arches of the foot

179. (d) Adductor magnus

(Ref : BDC 4th/e, vol II - pg 13)

The attachments on the ischial tuberosity are as follows :-

<u>Area</u>	<u>Attachment</u>
(1) The superolateral area	origin - semimembranosus
(2) The inferomedial area	origin - semitendinosus
(3) The outer lower area	origin - long head of biceps femoris
(4) The sharp medial margin of ischial tuberosity	The inner lower area is covered with fibrofatty tissue which supports body weight in the sitting position
(5) The lateral border of ischial tuberosity	sacrotuberous ligament
	ischiofemoral ligament

180. (b) Knee joint

(Ref : BDC 4th/e, vol II - pg 66)

OBTURATOR NERVE :-

Chief nerve of the medial compartment of the thigh

Origin and Root value :-

- ◆ Branch of lumbar plexus
- ◆ Formed by ventral divisions of the anterior primary rami of spinal nerves L2,L3,L4
- ◆ Upper part of the nerve lies in pelvis
- ◆ Enters the thigh by passing through the obturator canal

Course & Relation :-

- (1) The nerve divides into anterior and posterior divisions in the obturator canal

(2) The anterior division passes downwards in front of obturator externus and behind pectineus which also separates it from the posterior division, and further downwards passes between adductor longus in front and adductor brevis behind

Anterior division supplies :-

- (1) Pectenous
- (2) Adductor longus
- (3) Gracilis
- (4) Adductor brevis (if it is not supplied by the posterior division)
- (5) Hip joint
- (6) Subsartorial plexus
- (7) Femoral artery in adductor canal

(3) Posterior division :-

- Enters thigh after piercing obturator externus
- Descends behind adductor brevis and in front of adductor magnus

Branches to :-

- (1) Obturator externus
- (2) Adductor magnus
- (3) Adductor brevis if not supplied by the anterior division
- (4) In the adductor canal - reduces to a thin genicular branch - enters popliteal fossa - pierces oblique popliteal ligament - supplies capsule & cruciate ligaments of the knee joint
- (5) Popliteal artery
 - Spasm of the adductors of the thigh in certain intractable cases of spastic paraplegia may be relieved by surgical division of the obturator nerve
 - A disease of the hip joint may cause referred pain in the knee on the medial side of the thigh because of their common nerve supply

181. (a) The popliteal fossa is bounded above by tendons of the hamstring muscles and below by two heads of the gastrocnemius muscles
- (b) The deepest structure in the popliteal fossa is the popliteal artery
- (c) The popliteal and femoral vessels are continuous through the adductor hiatus

(Ref : BDC 4th/e, vol II - pg 82 - 83)

Popliteal Fossa :-

- ◆ The popliteal fossa is a diamond shaped depression, behind the knee joint, lower part of femur and upper part of tibia
- ◆ Boundaries :-
 - Superolaterally → biceps femoris

- Superomedially →

- (1) Semitendinosus
- (2) Semimembranosus supplemented by
- (3) Gracilis
- (4) Sartorius and
- (5) Adductor magnus.

Inferolaterally → Lateral head of the gastrocnemius supplemented by plantaris

Inferomedially → Medial head of gastrocnemius

Roof : Deep fascia and popliteal fascia.

Superficial fascia contains

- (1) Short saphenous vein
- (2) Three cutaneous nerve of thigh
- (3) Posterior division of the medial cutaneous nerve of thigh
- (4) Peroneal / sural communicating nerve

Floor :

From above downwards :-

- (1) Popliteal surface of femur
- (2) Capsule of knee joint
- (3) Oblique popliteal ligament
- (4) Popliteal fascia covering popliteus muscle

Contents :-

- (1) Popliteal artery & its branches
 - (2) Popliteal veins & its tributaries
 - (3) Tibial nerve & its branches
 - (4) Common peroneal nerve & its branches
 - (5) Posterior cutaneous nerve of the thigh
 - (6) Genicular branch of the obturator nerve
 - (7) Popliteal lymph nodes
 - (8) Fat
- ◆ Tibial nerve being most superficial (posterior most)
 - ◆ Popliteal vein lies deep to tibial nerve
 - ◆ Popliteal artery is the deepest of all
 - ◆ Common peroneal nerve crosses the fossa obliquely from the superior angle of fossa (diamond-shaped) to the lateral angle, along the medial border of biceps femoris, lying in the same superficial plane as the tibial nerve

182. (d) All of the above; (Ref : BDC 4th/e, vol II - pg 48)

Three small arteries arising from the femoral artery can be seen a little below the inguinal ligament

(1) The superficial external pudendal artery :-

- pierces cribriform fascia
- runs medially in front of the spermatic cord
- supplies : - the external genitalia

(2) The superficial epigastric artery :-

- pierces the cribriform fascia
- runs towards the umbilicus
- supplies : - lower part of anterior abdominal wall

(3) The superficial circumflex iliac artery :-

- pierces fascia lata lateral to saphenous opening
- runs upwards below the inguinal ligament and anastomoses with :-

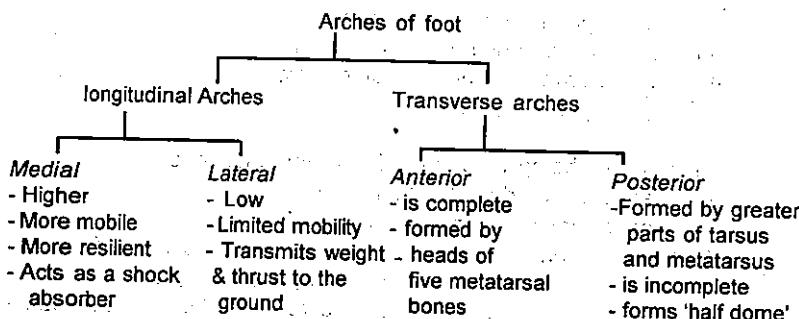
 - (1) The deep circumflex iliac artery
 - (2) The superior gluteal artery
 - (3) The lateral circumflex femoral arteries

At the anterior superior iliac spine.

183. (a) Is divided into medial and lateral portions anteriorly with the calcaneous forming a common component posteriorly
 (b) Is highest (most superior) at the level of the talus
 (c) Receives medial support primarily from the plantar calcaneo-navicular (spring) ligament, which directly supports the head of the talus
 (d) Is arranged so that weight is distributed anteriorly to the heads of the metatarsals and posteriorly to the calcaneus

(Ref : BDC 4th/e, vol II - pg 160- 162)

(Since all the options are explanatory I shall not waste time with the same facts but I shall try and add to your knowledge with a few extra facts)



Longitudinal arches	
Medial longitudinal arches	Lateral longitudinal arches
◆ <u>Ends</u>	<u>Ends</u> :-
<u>Anterior end</u>	<u>Anterior end</u>
- heads of 1st, 2nd, 3rd metatarsals	- heads of 4th & 5th metatarsal bones
- phalanges do not take part in forming arches	
<u>Posterior end</u> :	<u>Posterior ends</u> :-
- Medial tubercle of the calcaneum	- lateral tubercle of calcaneum
<u>Summit</u> :-	<u>Summit</u> :-
formed by the superior articular surface of the body of talus	at the level of articular facets on the superior surface of the calcaneum at the level of the subtalar joint.
<u>Pillars : Anterior pillar</u>	<u>Pillars : Anterior pillar</u> :-
- long & weak	- long & weak
- formed by talus, navicular and three cuneiform bones, first three metatarsals	- formed by cuboid bone & by the 4th & 5th metatarsals
<u>Posterior pillar</u>	<u>Posterior pillar</u> :-
- Short & strong	- short & strong
- formed by medial part of calcaneum	- formed by lateral half of the calcaneum
<u>Main joint</u> : Talo calcaneonavicular joint	<u>Main joint</u> :- Calcaneocuboid joint

Factors for maintenance of arches :-(1) Bony factor :-

- Important in case of posterior transverse arch
- Mainly because of the fact that the tarsal bones i.e. the cuneiform bones and the heads of the metatarsals are wedge shaped with their apex pointing downwards

(2) Intersegmental ties : (unite the bones together)

- (a) Spring ligament for → medial longitudinal arch
- (b) Long and short plantar ligaments → lateral longitudinal arch
- (c) Interosseous muscles → transverse arches

(3) Tie Beams : (Arches are prevented from being flattened)

- (a) Longitudinal arches → plantar aponeurosis, muscles of first layer of sole
- (b) Transverse arches → Adductor hallucis

(4) Slings : (They exert an upwards pull to maintain the shape and dome / summits of arches)

- (a) Summit of medial longitudinal arch
 - (1) tibialis posterior

- (2) flexor hallucis longus
 - (3) flexor digitorum longus
 - (b) Summit of lateral longitudinal arch
 - (1) peroneus longus
 - (2) peroneus brevis
 - (c) Tibialis anterior & peroneus longus together form a stirrup, keeping the middle of foot pulled upwards, supporting longitudinal arches
 - (d) The medial & lateral margins of the sole of the foot are pulled closer together because the tendon of peroneus longus runs transversely across the sole
 - Maintaining transverse arches
 - Also tibialis posterior grips many of the bones together through its slips
 - ♦ Absence / collapse of Arches → flat foot (or) pes planus
- Effects :
- (a) Clumsy, shuffling gait
 - (b) More liable to trauma & osteoarthritis
 - (c) Compression of nerves & vessels due to loss of concavity
 - (d) Compression of the communication between medial & lateral plantar nerves leads to neuralgic pain in the forefoot (metatarsalgia)
 - (e) Also vascular disturbance of toes
- ♦ Exaggeration of longitudinal arches - pes cavus
 - Usually due to contracture at transverse tarsal joint
 - If there is addition of dorsiflexion of metatarso phalangeal joints and plantar flexion of interphalangeal joints → claw foot
 - Common causes of pes cavus & claw foot are spina bifida & poliomyelitis

184. (b) Tibialis anterior

(d) Extensor hallucis longus

(Ref : BDC 4th/e, vol II - pg 152)

Muscle producing movements :-

Movement	Principal muscles	Accessory muscles
(a) Dorsiflexion : Tibialis anterior	N. S - (Deep peroneal Nerve L5, S1)	(1) Extensor digitorum longus N.S. - deep peroneal N (L5-S1)
		(2) Extensor hallucis longus N.S. - deep peroneal N (L5,S1)
		(3) Peroneus tertius N.S. - deep peroneal N (L5, S1)

- | | | |
|-----------------------|---|--|
| (b) Plantar flexion : | 1. Gastrocnemius
N.S. - Tibial Nerve
(S1, S2) | (1) Plantaris
N.S. Tibial N (S1, S2) |
| | 2. Soleus
N.S. - Tibial Nerve
(S1, S2) | (2) Tibialis posterior
N.S. Tibial N |
| | | (3) Flexor hallucis
longus
N.S. : - Tibial N |
| | | (4) Flexor digitorum
longus
N.S. : Tibial N |

185. (d) i.e., (b) Femoral vein &

(c) Femoral artery

(Ref : BDC 4th/e, vol II - pg 52, 53)

Femoral sheath :-

- ◆ Funnel shaped, sleeve of fascia covering upper 3 to 4 cm of femoral vessels
- ◆ Downward extension of two layers of fascia of abdomen
- ◆ Anterior layer → Fascia transversalis
- ◆ Posterior layer → Fascia iliaca
- ◆ Inferiorly the sheath merges with connective tissue around vessels

Sheath is divided into three compartments by septa :-

- (1) Lateral (or) arterial compartment → femoral artery & femoral branch of genito femoral nerve
- (2) Intermediate (or) venous compartment → femoral vein
- (3) Medial (or) venous compartment → smallest and is known as femoral canal

Femoral canal :-

- ◆ Conical - upper base - 1.5cm also called femoral ring & length - 1.5cm
- ◆ Contains lymph node of cloquet (or) rosenmuller drains glans penis in males & clitoris in females
- ◆ The inferior epigastric vessels are in close relation to the junction at lateral anterior walls of femoral ring
- ◆ A femoral hernia is more common in females because the femoral canal is wider in them than in males. Also associated with the wider pelvis and smaller size of the femoral vessels, in the females.

186. (d) Nerve to vastus intermedius

(Ref : BDC 4th/e, vol II - pg 60, 61)

ADDUCTOR / HUNTER'S / SUBSARTORIAL CANAL

- ◆ John hunter (1729- 1793), anatomist, surgeon at london
- ◆ The canal is an intermuscular space situated on the medial side of the middle one - third of thigh

- ♦ Extends from the apex of femoral triangle above to the tendinous opening in adductor magnus below, and it is triangular in cross-section
- ♦ Boundaries :-
- Anterior - vastus medialis
- Posterior / floor - Adductor longus (above)
 Adductor magnus (below)
- Medial wall/ roof - Strong fibrous membrane joining the anterior & posterior walls
- Roof is overlapped by sartorius
- Subsartorial plexus of nerves lies in the roof under sartorius (of course)
- It is formed by - Medial cutaneous nerve of thigh
 Saphenous nerve
 Anterior division of obturator nerve
- It supplies - Fascia lata
 Neighboring skin

Contents :

- (1) Femoral artery :- - enters at apex of femoral triangle
- gives muscular branches and descending genicular branch, which is the last branch of femoral artery, just above the hiatus magnus
- It divides into - superficial saphenous branch
 deep muscular branch
- (2) Femoral vein :- Posterior to femoral artery in upper part and lateral to the artery in lower part
- (3) Saphenous Nerve :- Crosses femoral artery from lateral to medial side. It leaves the canal with the saphenous artery by piercing the fibrous roof
- (4) Nerve to vastus medialis :- Lateral to femoral artery
- (5) Two divisions of obturator N :-
After ligature of the femoral artery in the adductor canal the collateral circulation is established through the anastomosis between :
 - (1) Descending branch of the lateral circumflex femoral (and) descending genicular arteries
 - (2) 4th perforating artery (and) muscular branches of the popliteal artery

187. (b) L2,L3,L4(Ref : *Snell's Neuroanatomy, 4th/e pg 139*)Knee jerk / Patellar tendon reflex :-

- ◆ Striking the ligamentum patellae with a reflex hammer causes elongation of the intrafusal fibres of the muscle spindles of the quadriceps muscle and stimulation of the annulospiral and flower spray endings
- ◆ The nerve impulses reach the spinal cord in the afferent neurons within the femoral nerve and enter the cord at the level of L2, L3 and L4
- ◆ The afferent neurons synapse with the large alpha motor neurons in the anterior gray horns of spinal cord
- ◆ Nerve impulses now pass via the efferent motor neurons in the femoral nerve and stimulate the extrafusal muscle fibres of the quadriceps muscle, which then contracts
- ◆ The muscle spindle afferent impulses inhibit the motor neurons of the antagonist muscles (reciprocal inhibition)

188. (c) Tensor fasciae latae(Ref : *BDC 4th/e, vol II - pg 57*)Femoral nerve :-

- ◆ Largest branch of the lumbar plexus
- ◆ Formed by **dorsal division** of the **anterior primary rami** of spinal nerves L2,L3,L4
- Course :-
- ◆ Passes behind inguinal ligament just lateral to femoral artery
- ◆ In thigh, lies in the groove between the iliacus and psoas major, outside the femoral sheath
- ◆ 2 cm below inguinal ligament the nerve divides into anterior and posterior divisions separated by lateral circumflex Femoral artery.

Branches :-(1) Muscular :- Anterior division :

(a) Sartorius

Posterior division :

(a) Rectus femoris

(b) The three vasti

(c) articularis genu

Articularis genu is supplied by a branch from nerve to vastus intermedius

(2) Cutaneous :- Anterior divisions (1) Intermediate & (2) Medial cutaneous nerve of thighPosterior division - Saphenous nerve

(3) Articular : Hip joint via nerve to rectus femoris

Knee joint via nerves to three vasti

Nerve to vastus medialis contains many proprioceptive fibres from the knee joint, accounting for its thickness

Hilton's law:- Nerve supply to a muscle which also crosses a joint, not only supplies the muscle but also supplies joint beneath and the skin overlying the muscle

(4) Vascular : To femoral artery and its branches

189. (b) Synonymous with plantar calcaneonavicular ligament

(Ref : BDC 4th/e, vol II - pg 154, 155)

Spring ligament / Plantar calcaneonavicular ligament :-

- ◆ It is the most important ligament for maintaining the medial longitudinal arch of the foot
- ◆ It is attached posteriorly to the anterior margin of the sustentaculum tali and anteriorly to the plantar surface of the navicular bone between its tuberosity & articular margin
- ◆ The head of talus rests directly on the upper surface of the ligament which is covered by fibrocartilage
- ◆ The plantar surface of the ligament is supported by the tendons of the tibialis posterior medially, by tendons of the flexor hallucis longus and the flexor digitorum longus

190. (a) Rotate the femur laterally on the tibia

(Ref : BDC 4th/e, vol II - pg 115)

POPLITEUS :-

- ◆ Flat, triangular muscle
- ◆ Confined to the uppermost part of the leg
- ◆ Origin is tendinous
- ◆ Insertion is fleshy

Origin :-

- ◆ Intracapsular
- ◆ The anterior part of the popliteal groove on the lateral surface of the lateral condyle of the femur (and)
- ◆ Arcuate popliteal ligament (and)
- ◆ Outer margin of the lateral meniscus of the knee joint

Insertion :-

- ◆ Posterior surface of the tibia
- ◆ Medial two-thirds of the triangular area above the soleal line

Nerve supply :- Tibial nerve (L4,L5,S1,S2,S3)

Actions :-

- (a) Rotates the femur laterally during the initial stages of flexion of the knee and thus unlocks the knee joint
- (b) It flexes the knee joint
- (c) Retracts the lateral meniscus and thus prevents it from being crushed between the condyles of the tibia and the femur

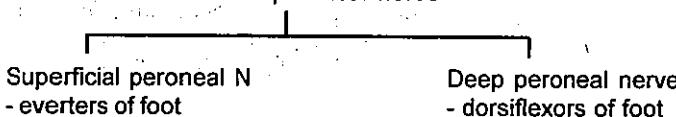
191. (a) Deep peroneal nerve

(Ref : BDC 4th/e, vol II - pg 86)

The common peroneal nerve (L4,L5,S1,S2) continuing downwards and forwards, it winds around the posterolateral aspect of the neck of the fibula, pierces the peroneus longus, and divides into the superficial and deep peroneal nerves.

Although it has cutaneous and articular branches, it does not have any muscular branches. However if at all it may supply short head of biceps femoris.

Common peroneal nerve



An injury to the common peroneal nerve at the neck of fibula may result in loss of these movements and result in a foot drop.

192. (e) Psoas major

(Ref : BDC 4th/e, vol II - pg 142, Table 12.1)

Movement	Chief muscles	Accessory muscles
(1) Flexion	Psoas major - branches from nerve roots of L2, L3	Pectenue - femoral nerve & posterior division obturator nerve
	Iliacus - femoral nerve	Rectus femoris - femoral N (L2, L3) Sartorius - femoral N (L2, L3, L4) Adductors - mainly adductor longus - Ant. div. of obturator (Participate in early stages)
(2) Extension	Gluteus maximus - inferior gluteal N (L5, S1, S2) Hamstrings - Semitendinosus & semimembranosus - Tibial N (L5, S1, S2)	
	Biceps femoris - <i>long head</i> - Tibial N <i>Short head</i> - common peroneal N (L5, S1, S2)	
(3) Adduction :-	Adductors :-	Pectenue Gracilis - Ant. div of obturator Nerve

	Longus - Ant] Obturator Brevis - nerve Magnus - Post. div of Obturator N & Tibial part of sciatic N
(4) Abduction	Glutei : - Tibial part of sciatic N Medius -] Minimus -] Superior
	Tensor fascia latae - superior gluteal N (L4, L5, S1) Sartorius - femoral N gluteal N (L4, L5, S1)

(5) Medial rotation Tensor fascia latae
anterior
fibres of glutei
medius &
minimus

(6) Lateral rotators Two obturators Piriformis - Ventral rami of
Externus - Post Div. S1, S2
of obturator N gluteus maximus &
(L2,L3,L4) sartorius
Internus - N. to obturator Internus
(L5,S1,S2)
Two gemelli
Superior - N. to obturator Internus
Inferior - N. to quadratus femoris
Quadratus Femoris
- Nerve to quadratus femoris
(L4 L5, S1)

193. (d) Iliofoemoral ligament

(Ref : BDC 4th/e, vol II - pg 140)

(In this reference it is mentioned as one of the strongest ligaments in the body)

- ♦ The iliofemoral ligament, or inverted Y shaped ligament of Bigelow lies anteriorly and it is one of the strongest ligaments in the body.
- ♦ It prevents the trunk from falling backwards in standing posture
- ♦ Triangular in shape
- ♦ Apex is attached to the lower half of the anterior inferior iliac spine & base to inter trochanteric line (on femur)

194. (c) Prepatellar

(Ref : BDC 4th/e, vol II - pg 48)

Subcutaneous bursae :-

- ◆ Lubricating mechanisms which are provided at sites of friction to smoothen movements
- ◆ Under pressure on them → Pathological enlargement

(1) Prepatellar bursa :-

- In front of lower part of patella and of upper part of ligamentum patellae
- Chronic enlargement → Housemaid's Knee
- Infection of this bursa is common in miner's (Miner's beat knee)

(2) Subcutaneous infra patellar bursa :-

- In front of lower part of tibial tuberosity and of the lower part of ligamentum patellae
- Enlargement in clergyman - Clergyman's knee

195. (c) Three points

Ref : Gray's Anatomy 39th/e pg 1477

- ◆ The menisci (semilunar cartilages) are crescentic laminae deepening the articulation of the tibial surfaces that receive the femur
- ◆ Menisci spread load by increasing the congruity of the articulation (In other words to increase the stability) give stability by their physical presence and as providers of proprioceptive feedback, probably assist lubrication, and may cushion extremes of flexion & extension (at knee joint)

◆ Medial menisci :-

- broader posteriorly
- almost semicircular
- attached by its anterior horn to anterior tibial intercondylar area (1)
- the posterior fibres of its anterior horn are continuous with the transverse ligament (2)
- the posterior horn is fixed to the posterior tibial intercondylar area (3)

Also : Its peripheral border is attached to the fibrous capsule and the deep surface of medial collateral ligament. Tibial attachment is called Coronary ligament.

- ◆ Medial meniscus is relatively fixed and moves much less than the lateral meniscus

Lateral meniscus :-

- four - fifths of a circle
- covers larger area

- If's anterior horn is attached in front of the intercondylar eminence, posterolateral to the anterior cruciate ligament, with which it blends
- It's posterior horn is attached behind this (intercondylar) eminence in front of the posterior horn of medial meniscus. Although the meniscofemoral ligaments are often the sole attachments of the posterior horn.
- More medially part of a tendon of popliteus is also attached to lateral meniscus, and so mobility of lateral meniscus may be controlled by meniscofemoral ligaments and popliteus
- A meniscofemoral ligament occurs in 80% of knee joints.

196. (c) Flexor hallucis brevis

(Ref : BDC 4th/e, vol II - pg 37)

(1) Posterior surface

- middle rough area -
- Tendocalcaneous Plantaris
- upper area - bursa
- lower area - dense fibro fatty tissue supports the body weight while standing

(2) Dorsal surface

- Lateral part of the non - articular area
 - (a) Origin of Extensor digitorum brevis
 - (b) Stem of inferior extensor retinaculum
 - (c) Stem of bifurcate ligament
- forms sulcus calcanei attaches Interosseous talocalcaneal ligament (medially), cervical ligament (laterally)

(3) Plantar surface

- Medial tubercles
 - (a)Origin of abductor hallucis (medially)
 - (b)Flexor retinaculum
 - (c) Flexor digitorum brevis (anteriorly)
 - (d)Plantar aponeurosis (anteriorly)
- Lateral tubercle
 - Origin to abductor digiti minimi
- Anterior tubercle
 - Short plantar ligament
 - Rough strip between the tubercles - long plantar ligament

(4) Lateral surface

Peroneal tubercle / trochlea

- Slip from inferior peroneal retinaculum
- The calcaneofibular ligament is attached 1cm behind the peroneal trochlea

(5) Medial surface

Medial margin of sustentaculum tali (groove on its lower surface is occupied by tendon of flexor hallucis longus)

Medial surface of this

- Spring ligament anteriorly
- Slip from tibialis posterior in middle
- Superficial fibres of deltoid ligament
- Medial talocalcaneal ligament posteriorly
- Flexor digitorum accessorius groove

Ossification of calcaneum :

1 Primary centre - appears in 3rd month of I. U life

1 secondary centre- appears between 6-8 years (scale like epiphysis on posterior surface)
- fuses - 14-16 years

197. (a) The perforating branches of the deep femoral artery

(Ref : BDC 4th/e, vol II - pg 56, 93)

PROFUNDA FEMORIS ARTERY :-

- ◆ The largest branch of the femoral artery
- ◆ The chief artery of supply to all the three compartments of the thigh
- ◆ Arises from the lateral side of femoral artery 4cm below the inguinal ligament
- ◆ Origin lies in front of iliacus
- ◆ Gives off lateral & medial circumflex femoral arteries and four perforating arteries
- ◆ The arteries on the back of thigh are terminal branches of the profunda femoris artery
- ◆ The main supply to the back of the thigh is through the perforating branches of the profunda femoris.
- 1st perforating artery - On (or) above upper border of adductor brevis
 - 2nd perforating artery - front of adductor brevis
 - 3rd perforating artery - below adductor brevis
 - 4th perforating artery - termination of profunda femoris artery
- ◆ They give off muscular, cutaneous and anastomotic branches
- ◆ 2nd perforating artery (sometimes 1st & 3rd) gives the nutrient artery to femur

198. (b) Peroneus tertius

(Ref.: BDC 4th/e, vol II - pg 43 fig 2.49)

Muscles attached to the plantar aspect of foot

- (1) Abductor hallucis - (origin and insertion)
 - (2) Flexor digitorum brevis - (origin and insertion)
 - (3) Abductor digiti minimi - (origin and insertion)
 - (4) Flexor digitorum accessorius
 - (5) Flexor digiti minimi brevis
 - (6) Flexor hallucis brevis
 - (7) Adductor hallucis (oblique head)
- (Consider the names and actions of the above muscles in order to remember their origins)
- (8) Tibialis posterior - (double insertion)
 - (9) Tibialis anterior - (double insertion)
 - (10) Peroneus longus - (double insertion)
 - (11) Peroneus brevis - (insertion)
 - (12) Flexor hallucis longus (insertion)

(These muscles come from superior origins to effect their action on foot / ankle joint)

(I) Muscle of the first layer of the sole :-

Muscle	Nerve supply	Action
(1) Flexor digitorum brevis (deep to plantar aponeurosis)	- Medial plantar Nerve	Flexion of toes at the proximal interphalangeal joints & metatarsophalangeal joints
(2) Abductor hallucis along medial border of foot (covers the origin of plantar vessels and nerves)	- Medial plantar Nerve	Abduction of the great toe away from the second toe
(3) Abductor digiti minimi (along lateral border of foot)	- Main trunk of lateral plantar nerve	Abduction of the little toe

(II) Muscles & tendons of second layer of sole :-

(1) Flexor digitorum longus	Tibial Nerve	<ul style="list-style-type: none"> - Plantar flexion of lateral four toes - Plantar flexion of ankle - Maintains medial longitudinal arch
(2) Flexor digitorum accessorius (accessory to digitorum longus)	Main trunk of lateral plantar nerve	<ul style="list-style-type: none"> - Straightens the pull of the long flexor tendons - Flexes the toes

		through the long tendons
(3) Lumbricals (4 in No., numbered from medial to lateral)	I st - medial plantar nerve other three by the deep branch of lateral plantar nerve	- They maintain the extension of digits at the interphalangeal joints so that in walking & running the toes do not buckle under
(4) Flexor hallucis longus	Tibial nerve	- Plantar flexor of big toe - Plantar flexor of ankle joint - Maintains medial longitudinal arch
(III) Muscles of the third layer of the sole :-		
(1) Flexor hallucis brevis (covers the plantar surface of 1st metatarsal).	Medial plantar nerve	Flexes the proximal phalanx at the metatarso phalangeal joint of the great toe
(2) Adductor hallucis	Deep branch of lateral plantar nerve which terminates in this muscle	- Adductor of great toe towards the second toe. - Maintains transverse arches of the foot
(3) Flexor digiti minimi brevis (along the fifth metatarsal bone)	Superficial branch of lateral plantar nerve	- flexes the proximal phalanx at the metatarso phalangeal joint of the little toe

Muscle of the 4th layer of sole :-

- (1) Interossei muscles
- (2) Tendons of Tibialis posterior
- (3) Tendons of peroneus longus

199. (b) Semimembranosus

(Ref : BDC 4th/e, vol II - pg 145)

The knee joint is supported by following ligaments :-

- (1) Fibrous capsule
- (2) Ligamentum patellae

- (3) Tibial collateral (or) medial ligament
- (4) Fibular collateral (or) lateral ligament
- (5) Oblique popliteal ligament
- (6) Arcuate popliteal ligament
- (7) Anterior cruciate ligament

Oblique popliteal ligament :-

- ◆ This is an expansion from the tendon of the semimembranosus
- ◆ Runs upwards & laterally and blends with the capsule and is attached to intercondylar line and lateral condyle of femur
- ◆ Closely related to popliteal artery
- ◆ Pierced by
 - (1) Middle genicular vessels and nerve
 - (2) Terminal part of posterior division of the obturator nerve

200. (c) Posterior tibial nerve

(Ref : Harrison's 16th/e pg 2502)

Harrison's gives the following table 363 - 1 in which it mentions

Nerve	Origin	Muscle innervated	Usual site of lesion	Clinical features
Posterior tibial nerve	L4-S1	Dorsiflexors of foot & toes, evertors of foot	Tarsal tunnel near medial malleolus	Pain and numbness of sole, weak toe flexors

This is known as Tarsal tunnel syndrome

Text mentions causes :

- (1) Sprain (or)
- (2) Fracture of ankle
- (3) ill - fitting foot wear
- (4) Post traumatic fibrosis
- (5) Cysts or ganglia adjacent to nerve
- (6) Arthritis
- (7) Tenosynovitis
- ◆ EDX (electro diagnostic) examination and nerve block using local anaesthetic are useful in diagnosis
- ◆ Defective treatment is extensive surgical decompression of tibial nerve in tarsal tunnel.

201. (c) 2.5cm

(Ref : Gray's Anatomy 39th/e pg 1453)

Long saphenous vein :-

- ◆ Longest vein in the body
- ◆ Starts distally as continuation of medial marginal vein of foot
- ◆ Ends in the femoral vein a short distance distal to the inguinal ligament

- ◆ It ascends 2.5 - 3 cm anterior to the tibial malleolus
- ◆ The centre of the opening (femoral) often said to be 2.5cm - 3.5cm inferolateral to the pubic tubercle
- ◆ However, the saphenous opening varies greatly in size and disposition so that this 'centre' is not a reliable surface marking for the saphenofemoral junction
- ◆ It has from 10 to 20 valves, which are more numerous in leg than the thigh

202. (a) Deep inguinal nodes

(Ref : BDC 4th/e, vol II - pg 133)

Deep inguinal nodes :-

- ◆ Almost 4-5 in number
- ◆ Lie medial to the upper part of the femoral vein
- ◆ The most proximal node of this group, gland of cloquet or of Rosenmüller lies in the femoral canal

These nodes receive afferents from :-

- (a) The superficial inguinal nodes
 - (b) The popliteal nodes
 - (c) Glans penis (or) clitoris
 - (d) The deep lymphatics of the lower limb accompanying the femoral vessels
- ◆ The efferents pass to the external iliac nodes

203. (d) Cruciate ligaments

(Ref : BDC 4th/e, vol II - pg 149)

- ◆ Structurally the knee joint is weak joint because the articular surfaces are not congruent, i.e the tibial condyles are too small and shallow to hold the large femoral condyles in place
- ◆ Also the femoropatellar articulation is quite insecure because
 - (1) Shallow articular surfaces
 - (2) Outward angulation between the long axis of the thigh and of the leg

The stability of the joint is maintained by a number of factors :-

- (1) The cruciate ligaments maintain the antero - posterior stability
- (2) The collateral ligaments maintain side to side stability
- (3) The factors strengthening the capsule have been enumerated earlier (Q. 203)
- (4) The iliotibial tract plays an important role

Injuries to cruciate ligaments

- ◆ The anterior cruciate ligament is more commonly damaged than the posterior
- ◆ It may be damaged in violent hyperextension of the knee
- ◆ Tear of the ligament leads to abnormal antero - posterior mobility

204. (d) All

(Ref : BDC 4th/e, vol II - pg 50, 59)

- ◆ Superiorly the tract splits into two layers
 - superficial lamina is attached to - tubercle of iliac crest
 - deep lamina to - capsule of hip joint
- ◆ Inferiorly it is attached to the lateral condyle of tibia
- ◆ Two muscles are inserted into upper parts, between the superficial and deep laminae. These are the three - fourths part of the gluteus maximus and the tensor fasciae latae.
- ◆ The iliotibial tract stabilizes the knee both in extension and in partial flexion and is, therefore, used constantly during walking & running
- ◆ Insertion of vastus lateralis
 - (a) Lateral part of the base of patella
 - (b) Upper 1/3rd of the lateral border of patella
 - (c) Expansion to the capsule of knee joint, tibia & iliotibial tract
- ◆ The fascia lata is attached to the inguinal ligament. Extension of the thigh pulls the abdominal wall downwards and makes it tense
- ◆ To relax the abdomen fully, the patient is asked to draw the legs up.

205. (a) Medial part of anterior intercondylar area of tibia**(d) Medial part of lateral condyle of femur**

(Ref : Gray's A 39th/e pg 1480)

Anterior cruciate ligament :-Attachments :-

- (1) To the anterior intercondylar area of the tibia, just anterior and slightly lateral to the medial tibial eminence, partly blending with anterior horn of medial meniscus
- (2) It ascends posterolaterally, twisting on itself and fanning out to attach high on the posteromedial aspect of the lateral femoral condyle.

Posterior cruciate ligament :-

Thicker and stronger than the anterior cruciate ligament

Its rupture is usually better tolerated than that of the anterior cruciate.

Attachments :-

- (1) Lateral surface of the medial femoral condyle and extends up onto the anterior part of the intercondylar notch
- (2) The fibres pass distally and posteriorly to a fairly compact attachment posteriorly in the intercondylar region and in a depression on the adjacent posterior tibia.

Unlike the anterior cruciate ligament, it is not isometric during knee motion i.e the distance between attachments varies with knee position.

206. (a) Nutrient artery

(Ref : Gray's A 39th/e pg 1436)

- ◆ The blood supply of the femoral head is derived from an arterial

ring around the neck, just outside the attachment of the fibrous capsule, constituted by the **medial and lateral circumflex femoral arteries**, with minor contributions from the **superior and inferior gluteal vessels**

- ◆ From this ring, ascending cervical branches pierce the capsule to ascend the neck beneath the reflected synovial membrane
- ◆ These vessels become the **retinacular arteries** and form a synovial intra - articular ring
- ◆ In displaced fractures of the neck these vessels are at risk and can cause **avascular necrosis of the femoral head**
- ◆ If the fracture is extracapsular, the retinacular vessels will remain intact
- ◆ Ascending cervical vessels → metaphyseal branches, entering neck
- ◆ Intra articular ring gives off → lateral & inferior epiphyseal branches
- ◆ A small medial epiphyseal supply, **of importance in early childhood**, reaches the head along the **ligamentum teres** by the acetabular branches of the obturator and **medial circumflex femoral arteries**, which anastomoses with the other epiphyseal vessels.

207. (d) Inferior epigastric artery

(Ref : Gray's 39th/e pg 1361)

"Occasionally the obturator artery is replaced by an enlarged pubic branch of the inferior epigastric artery which descends vertically to the obturator foramen.

- ◆ It usually lies near the external iliac vein, lateral to the femoral ring, and is rarely injured during inguinal (or) femoral hernia surgery.
- ◆ Sometimes, it curves along the edge of the lacunar part of the inguinal ligament, partly encircling the neck of the hernial sac, and may be inadvertently cut during enlargement of the femoral ring in reducing a femoral hernia".

208. (b) Gluteus medius & minimus

(Ref : BDC 4th/e, vol II - pg 75)

- ◆ When the gluteus maximus is paralysed as in muscular dystrophy → pt. cannot stand up from sitting posture without support → rises gradually first supporting their hands first on the legs and then on the thighs
- ◆ When gluteus medius and minimus are paralysed the patient cannot walk normally → sways (or) waddles on the paralysed side to clear the opposite foot off the ground - lurching gait. When bilateral → **waddling gait**
- ◆ Normal gait depends on proper abductor mechanism which depends on

- (a) adequate power of gluteus medius and minimus
- (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 femur

Trendelenberg's test :- Normally when the body weight is supported on one limb, the glutei of the supported side raise the opposite and unsupported side of pelvis. If the abductor mechanism is defective, the unsupported side of the pelvis drops and this is known as a positive trendelenburg's test.

209. (d) Saphenous nerve

(Ref : BDC 4th/e, vol II - pg 97)

The saphenous nerve is a branch of the posterior division of the femoral nerve. It pierces the deep fascia on the medial side of the knee between the sartorius and the gracilis and runs downwards in front of great saphenous vein. It supplies the skin of the medial side of the leg and the medial border of the foot up to the ball of the great toe.

210. (d) Popliteal L.N

(Ref : BDC 4th/e, vol II - pg 133)

- ◆ These nodes lie near termination of the small saphenous vein; deep to the deep fascia
- ◆ One node lies between the popliteal artery and the oblique ligament
- ◆ Afferents from :-
 - (a) The territory of the small saphenous vein (the area mentioned in the question)
 - (b) The deep parts of the leg (through vessels running along anterior & posterior tibial vessels)
 - (c) The knee joint
- ◆ Their efferents run along the popliteal & femoral vessels and terminate in the deep inguinal nodes

211. (b) Attached to head of fibula

(Ref : BDC 4th/e, vol II - pg 90)

- ◆ Semitendinosus and semimembranosus are both supplied by tibial part of sciatic nerve (L5,S1,S2)

Muscle	Origin	Insertion	Nerve Supply
Biceps femoris (2 heads of origin)	<p><u>Long head</u> :- Inferomedial impression on the upper part of the ischial tuberosity, is common with the semitendinosus & also from the lower part of the sacro tuberos ligament</p> <p><u>Short head</u> :-</p>	<p>either the tendon is folded around or is split by the fibular collateral ligament.</p> <p>It is inserted at the head of the fibula in front of its apex (or) styloid processes</p>	<p><u>Long head</u> :- Tibial part of sciatic nerve</p> <p><u>Short head</u> :- Common peroneal part of sciatic nerve (L5,S1,S2)</p>

212. (c) Internal pudendal artery

(Ref : BDC 4th/e, vol II - pg 79)

Structures passing through the greater sciatic foramen

(gateway of gluteal region)

- (A) The piriformis - fills the foramen almost completely
- key muscles of the region

(B) Structures passing above the piriformis

- (1) Superior gluteal nerve

- (2) Superior gluteal vessels

(C) Structures passing below the piriformis :-

- (1) Inferior gluteal nerve
(2) Inferior gluteal vessels
(3) Sciatic nerve
(4) Posterior cutaneous nerve of thigh
(5) Nerve to quadratus femoris
(6) Pudendal nerve
(7) Internal pudendal vessels
(8) Nerve to quadratus internus

The last three structures, after a short course in the gluteal region, enter the lesser sciatic foramen, where the pudendal nerve and internal pudendal vessels run in the pudendal canal.

Structures passing through the lesser sciatic foramen :-

- (1) Tendon of obturator internus
(2) Pudendal nerve
(3) Internal pudendal vessels
(4) Nerve to obturator internus

The upper and lower parts of the foramen are filled up by the origins of the two gemelli muscles.

213. (a) Compression of communication between medial and lateral plantar nerves

(Ref : Gray's A, 39th/e pg 1544)

NERVE ENTRAPMENT SYNDROMES IN FOOT :-

- ◆ Any nerve of the foot can be affected by entrapment leading classically to a burning sensation in the distribution of that nerve
- ◆ Tarsal tunnel syndrome is much less common to carpal tunnel syndrome
- ◆ The flexor retinaculum can compress the tibial nerve (or) either of its branches (medial and lateral plantar nerves), but is most commonly compressed by a space - occupying lesion eg. ganglion, a leash of vessels (or) the deep fascia associated with abductor hallucis
- ◆ Compression of the first branch of the lateral plantar nerve by the deep fascia of abductor hallucis can lead to heel pain

- ◆ The medial plantar nerve can be irritated at the master knot of Henry : Usually related to jogging (This is the anatomical landmark where tendon of flexor hallucis longus crosses deep to the tendon flexor digitorum longus, to reach medial side of sole of foot)

The superficial peroneal nerve :-

- ◆ Can be damaged in severe inversion injuries of the ankle

The deep peroneal nerve :-

- ◆ is sometimes compressed by osteophytes in the region of the second tarsometatarsal joint

Surgical nerve entrapment :-

- ◆ does not occur from compression by facial elements
- ◆ rather, it follows trauma and subsequent scar formation around the nerve

Entrapment of the common digital nerve :-

- ◆ as it passes under the intermetatarsal ligament of the third (or less commonly the second) webspace can result in morton's neuroma, which is probably the most common form of nerve entrapment in the foot
- ◆ Now the catch here is what is the common digital nerve
- ◆ well the explanation is like this!

The lateral plantar nerve divides into

- (1) Superficial branch and
- (2) deep branch

The superficial one splits into : - (2 common digital plantar nerves)

- (a) Lateral and,

- (b) Medial

The lateral supplies :-

- ◆ lateral side of fifth toe
- ◆ flexor digiti minimi brevis
- ◆ the two interossei (4th intermetatarsal space)

The medial branch (medial common plantar digital nerve)

Connects with the third common plantar digital branch of the medial plantar nerve and divides into two to supply the adjoining sides of the fourth and fifth toes.

This establishes the communication between the lateral and medial plantar nerves and also that it is the site of the most common form of nerve entrapment in the foot.

214. (a) Calcaneonavicular (spring) ligament

(Ref : BDC 4th/e, vol II - pg 151)

The ankle joint is supported by following ligaments :-

- (1) Fibrous capsule
- (2) Deltoid or medial ligament
 - superficial and deep parts

- both arise (origin) from apex and margins of the medial malleolus

Superficial part :-

- (1) Anterior / tibio navicular
(inserted) attached to the tuberosity of navicular and to medial margin of the spring ligament
- (2) Middle fibres/ Tibio calcaneal
- attached to whole length of sustentaculum tali
- (3) Posterior fibres / tibiotalar
- attached to medial tubercle and to adjoining part of the medial surface of talus.

Deep part of deltoid ligament / Anterior tibiotalar :-

- ◆ attached to the anterior part of the medial surface of talus

(3) Lateral ligament :

In has three bands :-

- (a) Anterior talofibular
- (b) Posterior talofibular
- (c) The calcaneofibular

215. (b) Tibialis posterior

(Ref : BDC 4th/e, vol II - pg 116)

Tibialis posterior :-

- ◆ deepest muscle on the back of leg

Origin :-

- ◆ Upper 2/3rd of lateral part of posterior surface of tibia, below the soleal line
- ◆ The posterior surface of the fibula in front of medial crest
- ◆ The posterior surface of the interosseous membrane

Insertion :-

- ◆ Chiefly into the tuberosity on the navicular bone
- ◆ Also gives off slips to all tarsal bones except the talus
- ◆ 2nd, 3rd, 4th metatarsal bones

Relations :-

- ◆ Passes behind the medial malleolus grooving it
- ◆ Passes deep to flexor retinaculum
- ◆ Terminal part of the tendon supports the spring ligament

Nerve supply :-

Tibial nerve

Actions : - invertor and powerful plantar flexor of foot

- maintains medial & transverse arches of foot.

Thorax

Questions

216. S.A. node is located (AI 88)

- a. Epicardially
- b. Intramyocardial
- c. Subepicardially
- d. Endocardially

217. Muscles of expiration (MAHE 98)

- a. Diaphragm
- b. Internal intercostal
- c. External intercostal
- d. Rectus abdominis

218. Trachea begins at the level of (KARNATAKA 89)

- a. Lower border of thyroid cartilage
- b. Lower border of cricoid
- c. Lower border of hyoid
- d. Fourth cervical vertebra

219. The anatomical division in the right middle lobe of lung is - (AI 93)

- a. Right and left
- b. Anterior and posterior
- c. Medial & Lateral
- d. Apical and inferior

220. Lung abscess secondary to aspiration is most often seen in (PGI 87)

- a. Anterior upper lobe
- b. Posterior upper lobe
- c. Posterior lower lobe
- d. Apical lower lobe

221. All generation of bronchus are fully present by ____ weeks of intrauterine life (AIIMS 80, AMU 89)

- a. 6th week
- b. 10th week
- c. 16th week
- d. 24th week

222. Carina in an adult is at the level of (PGI 81)
- T2
 - T3
 - T4
 - T6
223. During quiet breathing, the lower border of the lung is found at the level of the (AIIMS 78, PGI 81)
- Sixth rib in the midclavicular line
 - Tenth rib in the midaxillary line
 - Eighth rib in the midaxillary line
 - Twelfth rib in the scapular line
224. The lungs (PGI 79, 81)
- Receive parasympathetic innervation from the vagus nerve
 - Receive sympathetic innervation from preganglionic nerve cell bodies located in the intermediolateral cell column of the upper thoracic spinal cord segments
 - Are innervated by visceral afferents that utilize both the vagal and sympathetic pathways to enter C.N.S
 - Are drained by lymphatic pathways, both sides of which (left and right) terminate in the thoracic duct
225. The left coronary artery - (AIIMS 79, PGI 80)
- Has a branch that commonly anastomoses with the right coronary artery in coronary sulcus
 - Has a branch that commonly anastomoses with a branch of the right coronary in the interventricular sulcus
 - Is short in that soon after its origin it bifurcates into the anterior interventricular and circumflex arteries
 - Passes anterior to the pulmonary trunk
226. Posterior interventricular artery is a branch of the _____ artery (PGI 81, Delhi 85)
- Circumflex
 - Left coronary
 - Right coronary
 - None of the above
227. The esophagus - (PGI 81, 84)
- Passes through the esophageal hiatus at vertebral level of T10
 - Is found between the trachea and the thoracic duct in the superior mediastinum
 - Is typically ventral to the azygos vein in the lower thorax
 - Is adjacent to the right atrium as it passes posterior to the heart

- 228. Which of the following statements about the thoracic wall is / are true ? (PGI 82, 88)**
- a. The terminal branches of the typical posterior intercostal arteries anastomose with branches of the anterior intercostal arteries
 - b. The neurovascular bundle in the intercostal space passes along the superior border of the rib
 - c. The internal thoracic artery ends by dividing into superior epigastric and musculophrenic arteries
 - d. The sternal angle is at the level of the third costal cartilage
- 229. The sinus node is supplied by (PGI 83)**
- a. Right coronary artery
 - b. Right anterior ventricular artery
 - c. Left anterior descending artery
 - d. Atrioventricular nodal artery
- 230. Which does not drain into the coronary sinus - (AMC '88)**
- a. Great cardiac vein
 - b. Small cardiac vein
 - c. Anterior cardiac vein
 - d. Middle cardiac vein
- 231. Bronchopulmonary segment contains all except - (AIIMS 89)**
- a. Independent pulmonary artery
 - b. Independent pulmonary vein
 - c. Tertiary bronchiole
 - d. Conical segment
- 232. Which of the following structures do not pierce the diaphragm (AI 90)**
- a. I.V.C.
 - b. Aorta
 - c. Esophagus
 - d. Greater splanchnic nerve
- 233. All are true about trachea except (AI 90)**
- a. 15cm long
 - b. Bifurcates at C7
 - c. Lined by pseudostratified columnar epithelium
 - d. Tracheal cartilage is circular

234. Bronchial veins of the right side open into (Kerala 90)

- a. Superior vena cava
- b. Azygos vein
- c. Hemiazygos vein
- d. None of the above

235. Which is true about the apex of the left lung (AI 91)

- a. Subclavian artery forms a groove
- b. Middle cervical ganglion lies behind it
- c. Closely adherent to cervical pleura
- d. Ends at second costal cartilage

236. All are the direct articulations of the true rib except (AI 91)

- a. Costosternal joint
- b. Costochondral joint
- c. Costotransverse joint
- d. Costovertebral joint

237. Which is true about arch of aorta (AI 91)

- a. Starts at 3rd right I.C.S. and ends at left 3rd I.C.S
- b. Left vagus arches over it
- c. Lies behind body of sternum
- d. It is closely related to parietal pleura

238. The base of the heart is related to (JIPMER 91)

- a. Azygos vein
- b. Tracheal bifurcation
- c. Descending aorta
- d. Central tendon of diaphragm

239. Which of the following about parietal pleura is correct - (AI 92)

- a. Supplied by vagus N
- b. Sensitive to pain
- c. Derived from splanchnopleural layer of lateral plate mesoderm
- d. Extends up to T2

240. The inferior surface of the heart is formed by (AI 93)

- a. Right and left ventricle
- b. Right atrium and ventricle
- c. Interventricular septum
- d. I.V.C. and right ventricle

- 241. The following form the boundaries of the Koch's triangle except - (JIPMER 93)**
- a. Tendon of Todaro
 - b. Septal leaflets of tricuspid valve
 - c. Orifice of coronary sinus
 - d. Origin of the left coronary artery
- 242. Great cardiac vein lies in (PGI 95)**
- a. Anterior I.V. groove
 - b. Posterior I.V. groove
 - c. Anterior A.V. groove
 - d. Posterior A.V. groove
- 243. In a cross section of thorax at T4, which is found (AI 95)**
- a. Azygos vein
 - b. Brachiocephalic artery
 - c. Arch of aorta
 - d. Left subclavian
- 244. Structure arching over hilum of right lung is (AI 96)**
- a. Azygos vein
 - b. Thoracic duct
 - c. Superior vena cava
 - d. Arch of aorta
- 245. Lower border of costodiaphragmatic recess is at level of following rib - (AI 96)**
- a. 6th Rib
 - b. 8th Rib
 - c. 10th Rib
 - d. 12th Rib
- 246. Bundle of HIS is (Karnataka 96)**
- a. Highly susceptible to Ischaemia
 - b. Mainly supplied by right coronary
 - c. Mainly supplied by left coronary
 - d. Has a dual blood supply
- 247. Part of the heart lying in front of oesophagus (TN 97)**
- a. Left atrium
 - b. Left ventricle
 - c. Right ventricle
 - d. Right atrium

248. Correct about right and left main bronchi is (PGI 97)
- a. Right bronchus is more vertical and broader than the left
 - b. Right bronchus is more vertical and has a narrow calibre than the left
 - c. Left bronchus is more vertical and broader than right
 - d. Left bronchus is more vertical and narrower than right
249. True ribs are (CUPGE 97)
- a. 7th Rib
 - b. 8th Rib
 - c. 10th Rib
 - d. 12th Rib
250. Which of the following structures is not situated between the neck of the first rib and apex of the lung (ICS 98)
- a. First posterior inter costal vein
 - b. Superior intercostal artery
 - c. Thoracic duct
 - d. Sympathetic trunk
251. Oesophagus receives blood supply from all except (AIIMS 98)
- a. Inferior thyroid artery
 - b. Inferior phrenic artery
 - c. Internal mammary artery
 - d. Bronchial artery
252. The oblique sinus of the pericardium lies - (AMC 99)
- a. Behind the left atrium
 - b. Behind the ascending aorta
 - c. Behind the S.V.C.
 - d. Anterior to pulmonary trunk
253. Sympathetic innervation of heart is by (DNB 2001)
- a. T1 - T3
 - b. T2- T6
 - c. T3 - T7
 - d. L1- L5
254. Which one of these muscles is not cut in posterolateral thoracotomy - (PGI 98)
- a. Serratus anterior
 - b. Pectoralis major
 - c. Latissimus dorsi
 - d. Intercostals

- 255. Bronchial artery supplies up to - (JIPMER 2003)**
- a. Terminal bronchiole
 - b. Respiratory bronchiole
 - c. Alveolus
 - d. Secondary bronchus
- 256. The commonest variation in the arteries arising from the arch of aorta is - (AI 03)**
- a. Absence of brachiocephalic trunk
 - b. Left vertebral artery arising from the trunk
 - c. Left common carotid artery arising from brachiocephalic trunk
 - d. Presence of retro esophageal subclavian artery
- 257. The lumbar region of the vertebral column permits all of the following movements except (AI 03)**
- a. Flexion
 - b. Extension
 - c. Lateral flexion
 - d. Rotation
- 258. The middle cardiac vein is located at the (AI 03)**
- a. Anterior interventricular sulcus
 - b. Posterior interventricular sulcus
 - c. Posterior A.V. groove
 - d. Anterior A.V. groove
- 259. In angina pectoris, the pain radiating down the left arm is mediated by increased activity in afferent (sensory) fibres contained in the (AIIMS 03)**
- a. Carotid branch of the glossopharyngeal nerve
 - b. Phrenic nerve
 - c. Vagus and recurrent laryngeal nerve
 - d. Thoracic splanchnic nerve
- 260. The stability of the vertebral column is due to (Bihar 03)**
- a. Vertebra and vertebral discs
 - b. Interspinous ligaments
 - c. Paraspinal muscle
 - d. All
- 261. Left superior intercostal vein drains into (APPGE 04)**
- a. Azygos vein
 - b. Hemiazygos vein
 - c. Innominate vein
 - d. Left brachiocephalic vein

176 Anatomy

262. The arch of aorta lies in the _____ mediastinum (TN 04)

- a. Posterior
- b. Anterior
- c. Middle
- d. Superior

263. The coronary sulcus is occupied by the _____ sinus (DNB 89)

- a. Pulmonary
- b. Coronary
- c. Aortic
- d. Oblique

Thorax

Answers

216. (c) Sub epicardially

(Ref : Gray's A 39th/e pg 1012)

- ◆ The S.A. Node is an elliptical structure - 10-20mm long
- ◆ Located at the junction between parts of the right atrium derived from the embryonic venous sinus and atrium proper
- ◆ The node is often covered by a plaque of subepicardial fat, making it visible in some instances to the naked eye
- ◆ Nodal tissue does not occupy the full thickness of the right atrial wall from epicardium to endocardium in humans, but rather sits as a wedge of specialized tissue subepicardially within the terminal groove.

217. (b) Internal intercostal

(d) Rectus abdominis

(Ref : BDC 4th/e, vol I - pg 203, 204, 207)

Respiratory muscles :-

(1) Quite breathing :-

Inspiration :- Chiefly by diaphragm partly by intercostal muscles

Expiration :- Passive process

- Occurs by elastic recoil of the pulmonary alveoli and thoracic wall

(2) Forced breathing :-

Inspiration :- (1) Diaphragm

(2) Intercostal muscles

(3) Sternocleidomastoids

(4) Scaleni

(5) Serratus anterior

(6) Pectoralis minor

(7) Erector spinae

(8) Alaque nasi open up the nares

Expiration :- (1) Muscles of abdominal wall (Which includes rectus abdominis)

(2) Latissimus dorsi

The intercostal muscles by enlarging make the chest wall stiff increasing the efficiency of diaphragm and also the vital capacity (Gray's A 39th/e pg 1085)

◆ The external intercostals → elevate the ribs during inspiration

◆ The internal intercostals → depress the ribs (or) cartilages during expiration

218. (b) Lower border of cricoid

(Ref : BDC 4th/e, vol III - pg 194)

Trachea :-

- ◆ 10-15 cm long
- ◆ External diameter 2cm in male and 1.5cm in female
- ◆ Lumen is smaller in living than in cadavers
- ◆ 3mm - 1yr
- ◆ corresponds to age - during childhood
- ◆ 12mm - during puberty
- ◆ Trachea begins at lower border of the cricoid cartilage opposite the lower border of vertebra C6
- ◆ Follows the curvature of spine
- ◆ Enters thorax in the median plane

219. (c) Medial and lateral

(Ref : BDC 4th/e, vol I - pg 239)

<u>Right lung</u>		<u>Left lung</u>	
<u>Lobes</u>	<u>Segments</u>	<u>Lobes</u>	<u>Segments</u>
(A) Upper	(1) Apical (2) Posterior (3) Anterior	(A) Upper I Upper division	(1) Apical (2) Posterior (3) Anterior
(B) Middle	(1) Lateral (2) Medial	II Lower division (B) Lower	(4) Superior lingual (5) Inferior lingual
(C) Lower	(1) Superior (2) Anterior basal (3) Medial basal (4) Lateral basal (5) Posterior basal		(1) Superior (2) Anterior basal (3) Medial basal (4) Lateral basal (5) Posterior basal

220. (b) Posterior upper lobe

(d) Apical lower lobe

(Ref : Harrison's 16th/e pg 1538)

"Aspiration syndrome refer to clinical and pathophysiologic effects resulting from the introduction of foreign objects or substances into the lower respiratory tract.

The most commonly involved areas : those that are most dependent in the supine position - are the posterior segments of the upper lobe and the superior segments of the lower lobes.

Etiology : Usual causes in elderly :-

- (a) Enterobacteriaceae
- (b) S. aureus
- (c) S. pneumoniae
- (d) H. influenzae

221. (d) 24th week

(Ref : Gray's Anatomy 39th/e pg 1089)

Stages of lung development

- (a) Pseudoglandular stage (7-17 weeks)
- (b) Canalicular stage (17-26 weeks)
- (c) Saccular stage (24 weeks to birth)
- (d) Alveolar stage (28 weeks to 8 years)

(b) Canalicular stage (17-26 weeks)

♦ During the canalicular stage, about three generations of branching take place after which the amount of mesenchyme around the branching tips of the dividing respiratory tree decreases and the distal airspaces widen.

♦ At 23 weeks, longitudinal sections of the future distal regions show a saw-tooth margin, which may indicate the site of further acini.

(c) Saccular stage (24 weeks to birth)

♦ At this stage, thin walled terminal saccules are apparent. The expansion of the prospective respiratory airspaces that occurs during this period leads to further decrease in interstitial tissue.

222. (c) T4

(Ref : Gray's Anatomy 39th/e pg 1088, 1075)

Key anatomical points relevant to endotracheal tube positioning in the neonate

<u>Structure</u>	<u>Vertebral level</u>
(1) Vocal cords	C1-2
(2) Thoracic inlet	T1
(3) Carina	T 3-4, or T4

Trachea is 10-11cm long (10-15cm in B.D.C.) and descends from the larynx from the level of the sixth cervical vertebra to the upper border of the fifth thoracic vertebra, where it divides into right and left principal bronchi (Pg 1075)

Although according to surface anatomy (Pg 947) "The trachea bifurcates at the level of the sternal angle, the posterior landmark for the bifurcation is the fourth thoracic vertebra"

223. (a) Sixth rib in the midclavicular line**(c) Eight rib in the midaxillary line**

(Ref : BDC 4th/e, vol I - pg 226)

♦ The lower border of each lung lies two ribs higher than the pleural reflection, which is as follows :

- (a) Crosses 6th rib - midclavicular line
- (b) Crosses 8th rib - mid axillary line
- (c) Crosses 10th rib - at the lateral border of erector spinae
It ends 2cm lateral to the 10th thoracic vertebral spine

224. (a) Receive parasympathetic innervation from the vagus nerve
 (c) Are innervated by visceral afferents that utilize both the vagal and sympathetic pathways to enter CNS

(Ref: Grays 39th/e pg 1075, B.D.C I / 228)

- ♦ The lungs are innervated by vagal and sympathetic fibres
- ♦ The vagal fibres supply the bronchial muscles and glands and are bronchoconstrictor and secretomotor
- ♦ The efferent sympathetic fibres are inhibitory. They relax the bronchial smooth muscles and also have vaso constrictor effects

Pulmonary plexuses :-

- ♦ The pulmonary plexuses are anterior and posterior to the other hilar structures of the lungs
- ♦ The anterior plexus is much smaller and is formed by rami from vagal and cervical sympathetic cardiac nerves as well as direct branches from both sources
- ♦ The posterior plexus - formed by rami of vagal cardiac branches from the second to fifth (or) sixth thoracic sympathetic ganglia (Gray's - pg 235) - 10 to 12 thoracic (usually 11) ganglia
 - 4 lumbar ganglia
 - 4 (or) 5 ganglia in sacral region
- ♦ The cell bodies of preganglionic sympathetic neurons are located in the lateral horn of the spinal grey matter of all thoracic segments & upper 2 or 3 lumbar segments

225. (b) Has a branch that commonly anastomoses with a branch of a right coronary in the interventricular sulcus

- (c) Is short in that soon after its origin it bifurcates into the anterior interventricular and circumflex arteries

(Ref: Gray A 39th/e pg 1017, B.D.C I / 250)

(Gray's)

- ♦ Left coronary artery in its initial portion, between its ostium and its first branches varies in length from a few millimeters to a few centimeters
- ♦ The artery lies between the pulmonary trunk and the left atrial auricle, emerging into the atrioventricular groove in which it turns left
- ♦ The anterior interventricular (or) descending artery, more often turns around the apex into the posterior interventricular groove, where it meets the terminal twigs of the posterior interventricular branches of right coronary artery

(Ref : BDC 4th/e, vol I - pg 250)

Course of left coronary artery :-

- ♦ First runs forwards and to left and emerges between the pulmonary trunk and the left auricle

- ♦ Here it gives
 - (1) Anterior interventricular branch (LAD)
 - (2) Left circumflex artery (LCx)
- ♦ After giving off the L.A.D the artery runs to the left in the left coronary sulcus
- ♦ It winds around 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

226. (c) Right coronary artery

(Ref : BDC 4th/e, vol I - pg 249)

Branches of right coronary artery :-

- | | |
|--------------------|--------------------------------|
| (A) Large branches | (1) Marginal |
| | (2) Posterior interventricular |
| (B) Small branches | (1) Nodal in 60% cases |
| | (2) Right atrial |
| | (3) Infundibular |
| | (4) Terminal |

Cardiac Dominance :-

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

Mostly the right coronary artery gives the posterior interventricular artery. Such hearts are right dominant

Thus the artery giving the posterior interventricular branch is the dominant artery.

227. (a) Passes through the esophageal hiatus at vertebral level of T10

(b) Is found between the trachea and the thoracic duct in the superior mediastinum

(c) Is typically ventral to the azygos vein in the lower thorax

(Ref : BDC 4th/e, vol I - pg 267 - 269)

Oesophagus :-

- ♦ 25cm long
- ♦ Flattened tube (anteroposteriorly)
- ♦ The pharyngo - esophageal junction is the narrowest part (cricopharynx) of the alimentary canal except for the veriform appendix.
- ♦ Descends in front of the vertebral column through the superior and posterior parts of mediastinum and pierces the diaphragm at the level of tenth thoracic vertebra

Relations of thoracic part of oesophagus :-(A) Anteriorly :-

- (1) Trachea
- (2) Right pulmonary artery
- (3) Left bronchus
- (4) Pericardium with left atrium
- (5) The diaphragm

(B) Posteriorly :-

- (1) Vertebral column
- (2) Right posterior intercostal arteries
- (3) Thoracic duct
- (4) Azygos vein with the terminal parts of the hemiazygos veins
- (5) Thoracic aorta
- (6) Right pleural recess
- (7) Diaphragm

(C) To the right

- (1) Right lung & pleura
- (2) Azygos vein
- (3) Right vagus

(D) To the left :-

- (1) Aortic arch
- (2) Left subclavian artery
- (3) Thoracic duct
- (4) Left lung & pleura
- (5) Left recurrent laryngeal nerve

Superior mediastinum

Posterior mediastinum

- (1) Descending thoracic aorta
- (2) Left lung and mediastinal pleura

228. (a) The terminal branches of the typical posterior intercostal arteries anastomose with branches of the anterior intercostal arteries

(c) The internal thoracic artery ends by dividing into superior epigastric and musculophrenic arteries

(Ref : BDC 4th/e, vol I - pg 209, 206, 212, 194)

Termination of posterior intercostal artery

♦ Each posterior intercostal artery ends at the level of the costochondral junction by anastomosing with the upper anterior intercostal artery of the space

Each intercostal space contains :

- ◆ One posterior intercostal artery with its collateral branch
- ◆ Two anterior intercostal arteries
- ◆ The neurovascular bundle runs forwards in the costal groove (Which is along the lower inferior border of each rib) it is also the reason why pleural tapping is done at the upper border of lower rib to avoid injury to the neurovascular bundle
- ◆ The internal thoracic artery originates from the inferior aspect of the first part of the subclavian artery opposite the thyrocervical trunk, 2cm above the sternal end of the clavicle, it is marked over the upper 6 costal cartilages at a distance of 1.25cm from the lateral sternal border
- ◆ The artery terminates in the 6th intercostal space by dividing into the superior epigastric and musculophrenic arteries
- ◆ Needless to say, we all know this anatomical landmark called sternal angle by heart, as it is where the second costal cartilage articulates with sternum and also marks the surface marking of the point of bifurcation of trachea.

229. (a) Right coronary artery**(c) Left anterior descending artery**

(Ref : Gray's A 39th/e pg 1016)

- ◆ The atrial branches of the right coronary artery are sometimes described as anterior, lateral (right or marginals) and posterior groups
- ◆ The artery of the sinuatrial node is an atrial branch, distributed largely to the myocardium of both atria, mainly the right
- ◆ Its origin is variable, it comes from the circumflex branch of the left coronary in 35%. However more commonly it arises from the anterior atrial branch of the right coronary artery, less often from its right lateral part, less often from its posterior atrioventricular part
- ◆ The largest posterior septal artery, usually first said supplies the atrioventricular node in 80% of hearts
- ◆ According to B.D.C
 - Right coronary artery supplies S.A. node in 60% cases
 - Left coronary artery supplies SA node in 40% cases.

230. (c) Anterior cardiac vein

(Ref : BDC 4th/e, vol I - pg 251)

The veins of the heart are :-

- (1) Great cardiac vein
- (2) The middle cardiac vein
- (3) The right marginal vein
- (4) The posterior vein of left ventricle
- (5) The oblique vein of left atrium

- (6) The right marginal vein
- (7) The anterior cardiac veins
- (8) The venae cordis minimi.
- ♦ All veins except the last two drains into the coronary sinus which opens into the right atrium
- ♦ The anterior cardiac veins and venae cordis minimi open directly into the right atrium
- ♦ Coronary sinus is the largest vein of the heart

231. (b) Independent pulmonary vein

(Ref : BDC 4th/e, vol I - pg 229)

- ♦ The connective tissue septa between adjoining segment form intersegmental planes which are crossed by the pulmonary veins and occasionally by the pulmonary arteries
- ♦ Relation to pulmonary artery :-

 - The branches of pulmonary artery accompany the bronchi
 - The artery lies dorsolateral to the branches
 - Each segment has its own separate artery

- ♦ Relation to pulmonary vein :-

 - The pulmonary veins do not accompany the bronchi or the pulmonary arteries
 - They run in the intersegmental planes
 - Each segment has more than one vein and each vein drains more than one segment

The bronchopulmonary segment is not a bronchovascular segment because it does not have its own vein.

232. (b) Aorta

(Ref : Gray's Anatomy 39th/e pg 1083)

- ♦ The aortic aperture is the lowest and most posterior of the large openings
- ♦ At the level of the lower border of the 12th thoracic vertebra and the thoracolumbar intervertebral disc, slightly to the left of the midline
- ♦ It is an **osseous-aponeurotic opening**, defined by the diaphragmatic crura laterally, the vertebral column posteriorly and the diaphragm anteriorly
- ♦ Strictly speaking, it lies behind the diaphragm and its median arcuate ligament (when present)
- ♦ It transmits
 - Aorta
 - Thoracic duct
 - Lymphatic trunks from lower posterior thoracic wall
 - sometimes - Azygos & Hemiazygos veins
- ♦ The elliptical opening for the oesophagus is at T10 level, and is bounded by muscle fibres that originate in the medial part of the

right crus. It transmits

- Oesophagus
- Gastric nerves
- Esophageal branches of left gastric vessels
- Some lymphatic vessels

- ◆ The vena caval aperture, the highest of the three large opening (T8 - T9), is quadrilateral, at the junction of the right leaf with the central area of the tendon, so its margins are aponeurotic. It is traversed by
 - Inferior vena cava
 - some branches of right phrenic nerve
- ◆ There are two lesser apertures in each crus :-
 - One transmits the greater splanchnic nerve
 - The other the lesser splanchnic nerve
- ◆ The ganglionated sympathetic trunk usually enter the abdominal cavity behind the diaphragm, deep to the medial arcuate ligament
- ◆ Openings for minute veins frequently occur in the central tendon

233. (b) Bifurcates at C7

(d) Tracheal cartilage is circular

(Ref : BDC 4th/e, vol I - pg 265- 266)

- ◆ The trachea is 10-15cm long
- ◆ External diameter 2cm (males) and 1.5cm (females)
- ◆ Upper border - lower border of cricoid cartilage opposite C6
- ◆ In cadaver - Its lower end lies at lower border of T4
- ◆ In living - in erect posture - lower border of T6
- ◆ The trachea has a fibro elastic wall supported by a cartilaginous skeleton formed a C-shaped rings, about 16-20 in number, the posterior gap is closed by a fibroelastic membrane contains transversely arranged smooth muscle known as the trachealis
- ◆ The lumen is lined by ciliated columnar epithelium

(Gray's A 39th/e pg 1057)

- ◆ The epithelia of the trachea, bronchi and bronchioles are in general similar to each other, with graded variations in the numbers of different cell types
- ◆ The extrapulmonary & larger intrapulmonary passages are lined by respiratory epithelium
 - Pseudostratified, predominantly ciliated and contains interspersed mucous secreting goblet cells
- ◆ There are fewer cilia in terminal and respiratory bronchioles and the cells are reduced in height to low columnar (or) cuboidal
- ◆ The epithelium in the respiratory bronchioles progressively reduces in height towards the alveoli and is eventually composed of cuboidal, non - ciliated cells

- ◆ Six different types of epithelial cells have been described in the conducting airways namely
 - (1) Ciliated columnar
 - (2) Goblet
 - (3) Clara
 - (4) Basal
 - (5) Brush
 - (6) Neuroendocrine

234. (b) Azygos vein

(Ref : BDC 4th/e, vol I - pg 213)

Tributaries of Azygos vein :-

- (1) Right superior intercostal vein - formed by 2nd, 3rd & 4th posterior intercostal veins
- (2) 5th to 11th right posterior intercostal veins
- (3) Hemiazygos vein at the level of T8 vertebra
- (4) **Right bronchial vein, near the terminal end of azygos vein**
- (5) Several esophageal, mediastinal, pericardial veins
- (6) Accessory hemiazygos vein at T8 vertebra
- (7) When the azygos vein begins as lumbar azygos vein the common trunk formed by the union of the right ascending lumbar vein and right subcostal vein is the largest tributary

235. (a) Subclavian artery forms a groove

(Ref : Gray's Anatomy 39th/e pg 1068)

APEX

- ◆ The apex, the rounded upper extremity, protrudes above the thoracic inlet where it contacts the cervical pleura, and is covered in turn by the suprapleural membrane
- ◆ Owing to the obliquity of the inlet, the apex rises 3-4cm above the level of the first costal cartilage although it is at level posteriorly with the neck of the first rib
- ◆ Its summit is 2.5cm above the medial third of the clavicle
- ◆ The apex is therefore in the root of the neck
- ◆ It has been asserted that since the apex does not rise above the neck of the first rib., it is really intrathoracic and that , it is the anterior surface which ascends highest in inspiration, but this requires confirmation
- ◆ **The subclavian artery arches up and laterally over the suprapleural membrane, grooves the anterior surface of the apex near its summit and separates it from scalenus anterior**
- ◆ Posterior to the apex are the cervicothoracic (stellate) sympathetic ganglion, the ventral ramus of the first thoracic spinal nerve and the superior intercostal artery
- ◆ **Scalenus medius is lateral**

- ◆ The brachiocephalic artery, right brachiocephalic vein and trachea on the right, while the left subclavian artery and left brachiocephalic vein are on the left.

236. (a) Costosternal joint

(Ref : BDC 4th/e, vol I - pg 200)

(A) Costovertebral joint :-

The head of a typical rib articulates with its own vertebra, and also with the body of the next higher vertebra to form 2 plane synovial joints separated by an intra - articular ligament

(B) Costotransverse joints :-

- The tubercle of a typical rib articulates with the transverse process of the corresponding vertebra to form a synovial joint
- The capsular ligament is strengthened by three costotransverse ligaments
- The articular facets on the tubercles of the upper six ribs are convex, and permit rotation of the rib neck for pump - handle movements of these ribs - thus increasing the antero posterior diameter of the thorax
- The articular facets of T7- T10 are flat permitting up and down gliding movements of the lower ribs - this results in increasing the transverse diameter of thorax

(C) Costochondral joints :-

Each rib is continuous anteriorly with its cartilage, to form a primary cartilaginous joint. No movements are permitted at these joints.

237. (d) It is closely related to parietal pleura

(Ref : BDC 4th/e, vol I - pg 260 - 261)

Relations of Arch of Aorta :-

(A) Anteriorly and to left :-

- (1) From before backwards (4 nerves)
 - (a) Left phrenic
 - (b) Lower cervical cardiac branch of left vagus
 - (c) Upper cervical cardiac branch of left sympathetic chain
 - (d) Left vagus
- (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

(B) 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

(C) Superior :- Three branches of the arch of aorta :-

- (1) Brachiocephalic
 - (2) Left common carotid
 - (3) Left subclavian artery
- All three arteries are crossed close to their origin by the left brachiocephalic vein

(D) Inferior :-

- (1) Bifurcation of the pulmonary trunk
 - (2) Left bronchus
 - (3) Ligamentum arteriosum with superior cardiac plexus on it
 - (4) Left recurrent laryngeal nerve
- ◆ Arch of aorta begins at the upper border of 2nd right sternochondral joint and ends at the lower border of the body of the T4 vertebra
 - ◆ Thus the beginning and the end of the aorta are at the same level although it begins anteriorly and ends posteriorly

238. (c) Descending aorta

(Ref : BDC 4th/e, vol I - pg 240)

Base of the heart

- ◆ The base of the heart is also called its posterior surface, formed mainly by the left atrium and by a small part of the right atrium
- ◆ In relation to the base we see the openings of four pulmonary veins which open into the left atrium, and of the superior and inferior vena cava which open into the right atrium
- ◆ It is related to T5- T8 in lying posture and descends by one vertebra in the erect posture
- ◆ It is separated from the vertebral column by the
 - (1) Pericardium.
 - (2) The right pulmonary veins
 - (3) The oesophagus and the
 - (4) Aorta
- ◆ The clinicians often refer to the upper border of the heart as the base, which is the reason why most of students might think the answer as (b) i.e. tracheal bifurcation

239. (b) Sensitive to pain

(Ref : BDC 4th/e, vol I - pg 221)

Nerve supply of the pleura :-

- ◆ The parietal pleura develops from the somatopleuric layer of the

- lateral plate mesoderm and is supplied by somatic nerves which are the intercostal and phrenic nerves
- ◆ The parietal pleura is pain sensitive
- ◆ The pulmonary pleura develops from the splanchnopleuric layer of the lateral plate mesoderm and is supplied by autonomic nerves
- ◆ These are derived from the 2nd - 5th spinal segments while parasympathetic nerves are drawn from the vagus nerves
- ◆ This part of pleura is most sensitive to pain

240. (a) Right and left ventricle

(Ref : BDC 4th/e, vol I - pg 241)

- ◆ The Inferior or diaphragmatic surface rests on the central tendon of the diaphragm
- ◆ It is formed in its left 2/3rds by the left ventricle and in its right one third by the right ventricle
- ◆ It is traversed by the posterior interventricular groove and is directed downwards and slightly backwards.

241. (d) Origin of left coronary artery

(Ref : Gray's Anatomy 39th/e Pg 1001)

Koch's triangle :-

- ◆ The triangular area in the wall of the right atrium which marks the site of the atrioventricular node
- ◆ A triangular zone in found between the attachment of the septal cusp of the tricuspid valve, the anteromedial margin of the ostium of the coronary sinus, and the round, collagenous, palpable, subendocardial tendon of Todaro
- ◆ The triangle is a landmark of particular surgical importance indicating the site of atrioventricular node and its atrial connections

242. (a) Anterior I.V. groove

(d) Posterior A.V. groove

(Ref : BDC 4th/e, vol I - pg 251)

The great cardiac vein accompanies first the anterior interventricular artery (which occupies the anterior interventricular groove) and then the left coronary artery to enter the coronary sinus.

(Pg 250) The left coronary artery 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

(Also see fig 18.22 on Pg 251 to understand better)

243. (c) Arch of Aorta

(Ref : BDC 4th/e, vol II - pg 261 Fig 19.5)

I shall enumerate the structures shown in the fig from before backwards : The structures seen at a transverse section through T4 vertebra are : (This for the sake of memory only, for relations kindly see fig 19.5)

- (1) Manubrium
- (2) Thymus (median plane)
- (3) Left lung and pleura
- (4) Left phrenic nerve
- (5) Left superior intercostal vein
- (6) Arch of Aorta (The whole arch lies at this level)
- (7) Superior vena cava
- (8) Right phrenic nerve
- (9) Cardiac nerves (left of Arch and anterior)
- (10) Left vagus
- (11) Deep cardiac plexus (posterior to arch in median plane)
- (12) Trachea
- (13) Right vagus nerve
- (14) Left recurrent laryngeal nerve (in tracheoesophageal groove)
- (15) Oesophagus
- (16) Thoracic duct (Posterior and left of oesophagus)
- (17) Body of T4 vertebra

244. (a) Azygos vein

(Ref : BDC 4th/e, vol I - pg 224 Fig 16.2, 213)

Structures related to the mediastinal surfaces of the right & left lungs

Right side

- (1) Right atrium & auricle
- (2) A small part of right ventricle
- (3) Superior vena cava
- (4) Lower part of right brachiocephalic vein
- (5) Azygos vein
- (6) Oesophagus
- (7) Inferior vena cava
- (8) Trachea
- (9) Right vagus nerve
- (10) Right phrenic nerve

Left Side

- (1) Left ventricle, left auricle, infundibulum and adjoining parts of the right ventricle
- (2) Pulmonary trunk
- (3) Arch of aorta
- (4) Descending thoracic aorta
- (5) Left subclavian artery
- (6) Thoracic duct
- (7) Oesophagus
- (8) Left brachiocephalic vein
- (9) Left vagus nerve
- (10) Left phrenic nerve
- (11) Left recurrent laryngeal nerve

(Pg 210)

- (1) The azygos vein enters the thorax by passing through the aortic opening of the diaphragm
- (2) The azygos vein then ascends up to fourth thoracic vertebra where it arches forwards over the root of the right lung and ends by joining the posterior aspect of the superior vena cava just before the latter pierces the pericardium

245. (c) 10th rib

(Ref : BDC 4th/e, vol I - pg 220)

Recesses of Pleura :-

There are 2 folds/ recesses of parietal pleura, which act as 'reserve spaces' for the lung to expand during deep inspiration

(1) Costomediastinal recess :-

- Lies anteriorly
- Behind sternum and costal cartilages
- Between the costal & mediastinal pleurae
- Particularly in relation to cardiac notch of 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

(2) The costodiaphragmatic recess :-

- Lies inferiorly
- Between costal & diaphragmatic pleura
- Vertically measures 5cm
- Extends from 8th to 10th rib along the mid - axillary line.

246. (d) Has a dual blood supply

(Ref : BDC 4th/e, vol I - pg 249)

- ◆ Right coronary artery's area of distribution with respect to AV. bundle is that whole of the conducting system of the heart except a part of the left branch of the A.V. bundle
- ◆ And left coronary artery supplies that part of the left branch of AV bundle (Pg 250)

247. (a) Left atrium

(Ref : BDC 4th/e, vol I - pg 241, 268)

Relations of the thoracic part of esophagus :**(A) Anterior**

- (1) Trachea
- (2) Right pulmonary artery
- (3) Left bronchus
- (4) Pericardium with left atrium
- (5) The diaphragm

It is obvious that the diaphragm in the above case is not given to be anterior to oesophagus in its upper part, so do keep this orientation in mind, in all the relations enumerated.

(B) Posteriorly

- (1) Vertebral column
- (2) Right posterior intercostal arteries
- (3) Thoracic duct
- (4) Azygos vein with the terminal parts of the hemiazygos veins

- (5) Thoracic aorta
- (6) Right pleural recess
- (7) Diaphragm

(C) To the right :-

- (1) Aortic arch
- (2) Left subclavian artery
- (3) Thoracic duct
- (4) Left lung & pleura
- (5) Left recurrent laryngeal nerve

All in superior mediastinum

In the posterior mediastinum it is related to

- (1) Descending thoracic aorta
- (2) Left lung
- (3) Mediastinal pleura

248. (a) Right bronchus is more vertical and broader than the left

(Ref : BDC 4th/e, vol I - pg 228)

- ◆ The trachea divides at the level of the lower border of T4 vertebra into two primary principal bronchi, one for each lung
- ◆ The right principal bronchus is 2.5cm long. It is shorter, wider and more in line with the trachea than the left principal bronchus
- ◆ Inhaled particles, therefore, tend to pass most frequently to the right lung, with the result that infections are more common on the right side than on the left
- ◆ The left principal bronchus is 5cm. It is longer, narrower and more oblique than the right bronchus

249. (a) 7th rib

(Ref : BDC 4th/e, vol I - pg 189)

- ◆ There are 12 ribs on each side forming the greater part of the thoracic skeleton. The number may be increased by development of a cervical or a lumbar rib, (or) the number may be reduced to 11 by the absence of the 12th rib.
- ◆ The first 7 ribs which are connected through their cartilages to the sternum are called true ribs (or) vertebrosternal ribs
- ◆ The remaining five are false ribs
- ◆ Out of these the cartilages of the 8th, 9th and 10th ribs are joined to the next higher cartilage and are known as vertebrochondral ribs.
- ◆ The anterior ends of the 11th and 12th ribs are free and are called floating ribs or vertebral ribs

250. (c) Thoracic duct

(Ref : BDC 4th/e, vol I - pg 192)

Attachments and relations of the first rib :-

- (1) Anteriorly → neck is related from medial to lateral side to
 - (1) The sympathetic chain
 - (2) The first posterior intercostal vein
 - (3) The intercostal artery
 - (4) The first thoracic nerve
- (2) Superiorly → the neck is related to
 - (1) The deep cervical vessels
 - (2) The eighth cervical nerve
- (3) The anterior groove on the superior surface of the shaft lodges the subclavian artery and the lower trunk of the brachial plexus
- (4) The structures attached to the upper surface of the shaft are :-
 - (1) The origin of the subclavius muscle at anterior end
 - (2) The attachment of costoclavicular ligament at the anterior end behind the subclavius
 - (3) Insertion of the scalenus anterior on scalene tubercle
 - (4) Insertion of scalenus medius on the elongated rough area behind the groove for the subclavian artery
- (5) The lower surface of the shaft is covered by costal pleura
- (6) The outer border gives origin to
 - (1) External intercostal muscle
 - (2) The upper part of the 1st digitation of serratus anterior
 - (3) The thick portion of outer border covered by scalenus posterior
- (7) Inner border → attachment to supraperitoneal membrane
- (8) The tubercle gives attachment to the lateral costotransverse ligament

251. (c) Internal mammary artery

(Ref : BDC 4th/e, vol I - pg 269)

ARTERIAL SUPPLY OF OESOPHAGUS

- (1) The cervical part including the segment upto the arch of aorta is supplied by → Inferior thyroid artery
- (2) The thoracic part is supplied by the oesophageal branches of the aorta
- (3) The abdominal part → esophageal branches of the left gastric artery
 - ◆ Internal mammary artery has a course along the posterior aspect of the anterior thoracic wall 1.25cm lateral to the lateral margin of sternum and besides dividing into its terminal branches at 6th I.C.S. it gives small twigs supplying the muscles of the thoracic wall anteriorly.

252. (a) Behind the left atrium

(Ref : BDC 4th/e, vol I - pg 239)

- (1) The transverse sinus is a horizontal gap between the arterial and venous ends of the heart tube

- It is bounded anteriorly - the ascending aorta and pulmonary trunk
 - posteriorly - by the superior vena cava
 - inferiorly - left atrium
- On each side it opens into the general pericardial cavity

- (2) The oblique sinus is a narrow gap behind the heart
- It is bounded anteriorly - left atrium
 - posteriorly - parietal pericardium
 - On the right & left it is bounded by reflections of pericardium.
 - Below, and to the left it opens into the rest of the pericardial cavity
 - The oblique sinus permits pulsations of the left atrium to take place freely

253. (b) T2- T6

(Ref : BDC 4th/e, vol I - pg 252)

Nerve supply of the heart :-

- ◆ Parasympathetic nerves reach the heart via the vagus
- ◆ These are cardioinhibitory - on stimulation they slow down the heart rate
- ◆ Sympathetic nerves are derived from the upper two to five thoracic segments of the spinal cord (T2-T5)
- ◆ These are cardio acceleratory i.e. on stimulation they increase the heart rate, and also dilate the coronary arteries

Superficial cardiac plexus :-

- ◆ Situated below the arch of aorta in front of the right pulmonary artery
- ◆ Formed by :-

 - (1) Superior cervical cardiac branch of the left sympathetic chain
 - (2) Inferior cervical cardiac branch of the left vagus nerve

- ◆ branches to :-

 - deep cardiac plexus
 - right coronary artery
 - left anterior pulmonary plexus

Deep cardiac plexus :-

- In front of the bifurcation of trachea, and behind the arch of aorta
- ◆ Formed by :-

 - all the cardiac branches derived from all the cervical and upper thoracic ganglia of the sympathetic chain
 - cardiac branches of vagus and recurrent laryngeal nerve except those which form superficial cardiac plexus

- ◆ Branches to : - The right and left halves of the plexus distribute branches to the corresponding coronary and pulmonary plexuses
- separate branches are given to aorta

254. (b) Pectoralis major

(Ref : Bailey and love 23rd/e pg 780)

I shall describe only the incision as given in the above reference

- ◆ The incision is made from 1 to 2cm inferolateral to the nipple in men and the inframammary fold in women
- ◆ The incision extends along 1-2cm below the tip of the scapula and extends posteriorly and superiorly between the medial border of the scapula and the spine
- ◆ The incision is deepened through the subcutaneous tissues until the latissimus dorsi is met
- ◆ This muscle is divided with coagulating diathermy taking care over hemostasis. The line of division is the same as for skin
- ◆ A plane of dissection is developed by hand under the scapula and serratus anterior
- ◆ The ribs can be counted down from the highest palpable rib (which is usually the second) and the sixth rib periosteum is scored with the diathermy near its upper border.
- ◆ A periosteal elevator is used to lift the periosteum off the superior border of the rib
- ◆ This reveals the pleura which may be entered by blunt dissection
- ◆ A rib spreader is inserted between the ribs and opened gently to prevent fracture
- ◆ Exposure may be facilitated by dividing the rib at costal angle (or) by dividing the costotransverse ligament
- ◆ Routine resection of a rib is an uncommon practice
- ◆ The anaesthetist is now able to deflate the affected lung to allow a better view of the intrathoracic structures
- ◆ A rib approximator is used to realign the ribs and the stripped periosteum and intercostal muscle is sutured to the outer costal muscle below the stripped rib using continuous absorbable suture. A non-absorbable suture might be used if healing is likely to be compromised.

255. (b) Respiratory bronchiole

(Ref : Gray's A 39th/e pg 1078)

- ◆ The right bronchial artery → branch of third posterior intercostal artery
- ◆ The left (Normally 2) → upper & lower → branch separately from thoracic aorta

- ◆ The bronchial arteries accompany the bronchial tree and supply bronchial glands, the walls of the bronchial tubes & larger pulmonary vessels
- ◆ Bronchial arteries supply the bronchial wall as far as the respiratory bronchioles, and anastomose with branches of the pulmonary arteries in the walls of the smaller bronchi and in the visceral pleura

256. (c) Left common carotid artery arising from brachiocephalic trunk
 (Ref : Gray's A 39th/e pg 1023)

There are two aspects mentioned in the above reference which for the purpose of answering this question, should suffice. which are :

- (1) That there are many variations given in the text pertaining to the arch of aorta and its branches, but only one place mentions the percentage as in, "The left common carotid may arise from the brachiocephalic trunk (7%)"
 - Other variations of common carotid mentioned are rare than this but they do not mention percentage
 - With regards to 'Absence of brachiocephalic trunk' it is said, "More rarely, the left common carotid and subclavian arteries may arise from a left brachio cephalic trunk, or the right common carotid and right subclavian may arise separately, in which case the latter more often branches from the left end of the arch and passes behind the oesophagus.

" The left vertebral artery may arise between the left common carotid and the subclavian arteries" again percentage not mentioned
- (2) An analysis of variation in branches from 1000 aortic arches showed
 - (1) usual pattern in (65%)
 - (2) a left common carotid shared the brachiocephalic trunk (27%) (contrast percentage quoted above)
 - (3) four large arteries branched separately (2.5%)
 - (4) remaining 5% showed a great variety of patterns most common (1.2%) being symmetric right and left brachio cephalic trunk)

257. (d) Rotation

(Ref : BDC 4th/e, vol I - pg 202)

Movements of the vertebral column :-

- (1) Flexion and extension → freely occur in the cervical and lumbar region, but not in the thoracic region
- (2) Rotation → is free in the thoracic region, but not in the thoracic region, and restricted in the lumbar and cervical regions.

258. (b) Posterior interventricular sulcus

(Ref : BDC 4th/e, vol I - pg 251)

- ◆ The middle cardiac vein accompanies the posterior interventricular artery, and joins the middle part of the coronary sinus
- ◆ (Pg 249) The posterior interventricular artery is a branch of the right coronary artery which winds round the inferior border to reach the diaphragmatic surface of the heart, where it runs backwards and to the left in the right posterior coronary sulcus to reach the posterior interventricular groove

259. (d) Thoracic splanchnic nerve

(Ref : BDC 4th/e, vol I - pg 255)

Cardiac pain is an ischaemic pain caused by incomplete obstruction of a coronary artery.

Axons of pain fibres conveyed by the sensory sympathetic cardiac nerves reach thoracic one to five (T1- T5) segments of spinal cord mostly through dorsal root ganglia of the left side.

Since these dorsal root ganglia also receives sensory impulses from the medial side of arm, forearm and upper part of chest, the pain gets referred to these areas. The pain is usually referred to the left side, it may even be referred to right arm, jaw, epigastrium or back.

260. (d) All

(Ref : BDC 4th/e, vol I - pg 201, 202)

Inter vertebral joint :-

There is a median joint between the vertebral bodies which is - a symphysis (secondary cartilaginous joint) and there are two joints - right and left - between the articular processes - which is plane synovial joint

- ◆ They form bony frame work and also provide articulation

Intervertebral discs :

- ◆ Fibrocartilaginous
- ◆ Between the bodies of adjacent vertebrae
- ◆ Shape corresponds to that of vertebrae
- ◆ Thickness of disc varies
- ◆ In cervical and lumbar regions the disc are thicker in front than behind while in thoracic region they are of uniform thickness. It is thinnest in the upper thoracic region
- ◆ Has 2 parts :-
- (1) Nucleus pulposus :-
- Central part
- Kept under tension and acts as hydraulic shock absorber

- With age, its elasticity is reduced

(2) Annulus fibrosus :-

- Peripheral part
- Collagenous fibres - outer zone
- Fibro cartilage - inner zone
- Fibres form incomplete rings
- Rings - connected by strong bands
- Outer collagenous fibres blend with anterior and posterior longitudinal ligaments.

Functions :

- (1) Give shape to the vertebral column
- (2) Act as shock absorbers
- (3) Because of their elasticity, allow movement of vertebral bodies on each other, more so in cervical and lumbar regions

♦ **LIGAMENTS** : - Are listed as follows :-

- (1) Anterior longitudinal ligament - Upper end reaches basilar part of the occipital bone
- Anterior surfaces of vertebral bodies
- (2) Posterior longitudinal ligament - On posterior surfaces of vertebral bodies
- Upper end reaches body of axis vertebra beyond which it is continuous with membrana tectoria
- (3) Inter transverse ligament
- (4) Interspinous ligament
- (5) Supraspinous ligament
- (6) The ligamenta flava
In cervical region - replaced by ligamentum nuchae
- Connect the laminae of adjacent vertebra
They are made up mainly of elastic tissue

261. (d) Left brachiocephalic vein

(Ref : BDC 4th/e, vol I - pg 211)

Termination of Posterior intercostal veins

Veins	On the right side they drain into	On left side they drain into
1 st 2 nd , 3 rd , 4 th	Right brachiocephalic vein Join to form right superior intercostal vein which drains into the azygos vein	Left brachiocephalic vein Join to form left superior intercostal vein which drains into the left brachiocephalic vein
5 th to 8 th 9 th to 11 th & subcostal	Azygos vein	Accessory hemiazygos vein Hemiazygos vein

262. (d) Superior

(Ref : BDC 4th/e, vol I - pg 260)

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

263. (b) Coronary

(Ref : BDC 4th/e, vol I - pg 251)

- ◆ The coronary sinus is the largest vein of heart and it is situated in the left posterior coronary sulcus
- ◆ It is about 3cm long. It ends by opening into the posterior wall of the right atrium
- ◆ It receives -
 - (1) The great cardiac vein
 - (2) The middle cardiac vein
 - (3) The small cardiac vein
 - (4) The posterior vein of left ventricle
 - (5) The oblique vein of left atrium of marshall
 - (6) The right marginal vein

Histology

Questions

264. What best characterises the sinusoids (AMU 86)

- a. Have smaller diameter than lymph capillaries
- b. Are not found in skeletal muscles
- c. Have a continuous endothelial lining
- d. Have a continuous basement membrane

265. Select the statement which best characterises lymph capillaries (Rohtak 86)

- a. Have smaller diameter than blood capillaries
- b. Less permeable than blood capillaries
- c. Have no endothelial lining
- d. Have a discontinuous basement membrane

266. JG cells (Juxta glomerular apparatus) are (ROHTAK 87)

- a. Macula densa
- b. Smooth muscular cells of afferent arteriole
- c. Smooth muscular cells of efferent arteriole
- d. Islets of epithelial cells

267. The ureter is lined by _____ epithelium (AIIMS 84)

- a. Stratified squamous
- b. Cuboidal
- c. Ciliated columnar
- d. Transitional

268. Ducts of Bellini are found in (PGI 87)

- a. Pancreas
- b. Submandibular salivary glands
- c. Kidney
- d. Liver

269. Haversian system is seen in (HP 88)

- a. Cortical bone
- b. Cancellous bone
- c. Teeth
- d. Nail

- 270. Auerbach's plexus is present in the (Kerala 88, Karnataka 89)**
- a. Colon
 - b. Esophagus
 - c. Stomach
 - d. Small Intestine
 - e. All of the above
- 271. Which of the following are true of the nephron or its parts - (AP 89)**
- a. It is the principal site of action of anti-diuretic Hormone (ADH)
 - b. Sodium is actively transported by its cells
 - c. It is made up in part of a stratified epithelium
 - d. It is found in the pars convoluta, pars radiata and medulla
- 272. Good collateral circulation occurs in (AI 91)**
- a. Skin
 - b. Muscle
 - c. Fascia
 - d. Bone
- 273. Sinuses are not seen in - (Kerala 91)**
- a. Kidney
 - b. Spleen
 - c. Endocrine glands
 - d. Liver
- 274. Which is not a feature of skeletal muscle - (JIPMER 91)**
- a. Spindle shaped fibres
 - b. Syncytium
 - c. Striations
 - d. Hypolemmal nucleus
- 275. Epithelium of cornea is - (AP 91)**
- a. Pseudostratified
 - b. Transitional
 - c. Stratified squamous keratinized
 - d. Stratified squamous non-keratinised
- 276. Which of the following is lined by transitional epithelium (JIPMER 95)**
- a. Stomach
 - b. Colon
 - c. Urethro - vesical junction
 - d. Prostate

277. Toughest layer in esophagus is (AI 95)

- a. Mucosa
- b. Submucosa
- c. Muscularis
- d. Adventitia

278. Parietal peritoneum is lined by - (PGI 95)

- a. Simple squamous
- b. Stratified squamous
- c. Cuboidal and columnar epithelium
- d. Stratified squamous epithelium

279. Brunner's glands are located in the (CUPGEE 96)

- a. Duodenum
- b. Jejunum
- c. Ileum
- d. All

280. Space of Disse is seen in (MP 98)

- a. Spleen
- b. Kidney
- c. Liver
- d. Small intestine

281. Olfactory epithelium is - (Kerala 98)

- a. Squamous keratinised
- b. Squamous non-keratinised
- c. Stratified columnar
- d. Simple
- e. Pseudostratified

282. Holocrine secretion is seen in - (JIPMER 99)

- a. Salivary
- b. Mammary
- c. Sebaceous glands
- d. Gastric

283. The commonest cartilage to ossify in (TNPSC 2K)

- a. Hyaline
- b. Elastic
- c. Fibrous
- d. Fibroelastic

284. Stellate cells of von kuffer are seen in the sinusoids of which of the following organs (Kerala 2K)

- a. Spleen
- b. Bone marrow
- c. Liver
- d. Adrenal
- e. None of the above

285. Elastic cartilage is found in - (SGPGI 04)

- a. Auditory tube
- b. Nasal septum
- c. Articular cartilage
- d. Costal cartilage

Histology

Answers

264. (b) Are not found in skeletal muscles

(Ref : Gray's Anatomy 39th/e pg 143)

Sinusoids :-

- ◆ Sinusoids are expanded capillaries, and are large and irregular in shape
- ◆ They have true discontinuities in their walls, allowing intimate contact between blood & the parenchyma
- ◆ The discontinuities are formed by gaps between endothelial cells, which are also fenestrated, such that the sinusoidal lining, and sometimes also the basal lamina, is incomplete
- ◆ Sinusoids occur in large numbers in the liver (Where the basal lamina is completely absent), spleen, bone marrow, and suprarenal medulla.

265. (d) Have a discontinuous basement membrane

(Ref : Gray's Anatomy 39th/e pg 149)

- ◆ "Lymphatic capillaries form wide - meshed plexuses in the extracellular matrices of most tissues
- ◆ They begin as dilated, blind - ended tubes with larger diameters and less regular cross- sectional appearances than those of blood capillaries
- ◆ A basal lamina is incomplete (or) absent and they lack associated pericytes
- ◆ The smaller lymphatic vessels are lined by endothelial cells which have numerous transcytotic vesicles within their cytoplasm and so they resemble blood capillaries
- ◆ However, unlike capillaries, their endothelium is generally quite permeable to much larger molecules, they are readily permeable to large colloidal proteins, and particulate material such as cell debris and micro-organisms, and also to cells
- ◆ Permeability is facilitated by gaps between the endothelial cells, which lack tight junctions and by pinocytosis

266. (b) Smooth muscle cells of afferent arteriole

(Ref : Gray's Anatomy 39th/e pg 1283)

- ◆ The juxtaglomerular apparatus provides a tubulo glomerular feedback system which maintains systemic arterial blood pressure

during a reduction in vascular volume and decrease in filtration rate

- ◆ The afferent and efferent arterioles at the vascular pole of a glomerulus and the macula densa of the distal tubule of the same nephron lie in close proximity, enclosing a small cone of tissue populated by extra glomerular mesangial (lacis) cells.
- ◆ The cells of the tunica media of the afferent and, to a lesser extent, efferent, arterioles differ from typical smooth muscle cells
- ◆ They are large, rounded myoepitheloid cells and their cytoplasm contains many mitochondria and dense, renin containing vesicle, 10 - 40mm in diameter
- ◆ The juxtaglomerular cells form one element of the juxtaglomerular apparatus

267. (d) Transitional

(Ref : I.B. Singh - Textbook of Human Histology 3rd/e pg 258)

The wall of the ureter has three layers, an outer fibrous coat, a middle layer of smooth muscle, an inner lining of mucous membrane. The mucous membrane has a lining of transitional epithelium which is 4 to 5 cells thick. The epithelium does not have a distinct basal lamina. It rests on a layer of fibrous tissue containing many elastic fibres.

268. (c) Kidney

(Ref : Gray's Anatomy 39th/e pg 1551)

Bellini, ducts of - orifices of renal tubules

Lorenzo Bellini (1643 - 1704), Professor of Anatomy, Pisa Italy.

I.B. Singh Histology - 3rd/e pg 248 The collecting tubules draining different nephrons join to form larger tubules called the papillary ducts (of Bellini)

269. (a) Cortical bone

(Ref : I.B. Singh 3rd/e pg 96-97)

Structure of a compact bone :-

- ◆ When we examine a section of compact bone we find that this type of bone is also made up of lamellae, and is pervaded by lacunae (containing osteocytes) and by canaliculi
- ◆ Most of the lamellae are arranged in the form of concentric rings that surround a narrow haversian canal present at the centre of each ring
- ◆ The Haversian canal is occupied by blood vessels, nerve fibres, and some cells
- ◆ One Haversian canal and the lamellae around it constitute a Haversian system (or) osteon.

270. (e) All of the above

(Ref : Gray's Anatomy 39th/e pg 1141)

INTRINSIC INNERVATION :-

- ◆ The intrinsic innervation of the gut wall is derived from neurons which are located entirely within the wall in intramural ganglionated plexuses
- ◆ The myenteric (Auerbach's) plexus is a network of fine bundles of axons and small ganglia which lies within the muscularis externa between the circular and longitudinal layers
- ◆ It is often associated with secondary and tertiary plexuses of nerve fibres which sometimes contain isolated neuronal cell bodies
- ◆ There are two (or) more submucosal plexuses, the most superficial of which is Meissner's plexus
- ◆ All parts of the myenteric plexus are continuous not only with each other, but also with the nerve fibre bundle in the circular muscles
- ◆ The latter are connected to the ganglionated and non ganglionated plexuses of the submucosa and these in turn are connected with the mucosal plexus by fibres which pass through the muscularis mucosa

271. (b) Sodium is actively transported by its cells

(d) It is found in the pars convoluta, pars radiata and medulla

(Ref : Gray's Anatomy 39th/e pg 1278, 1279, 1280, 1281)

- ◆ Renal tubules are lined throughout by a single layered epithelium. The type of epithelial cell varies according to the functional roles of the different regions

Eg : Active transport and passive diffusion of various ions and water into and out of the tubules, reabsorption or organic components such as glucose and amino acids, uptake of any proteins which leak through the glomerular filter.

- Proximal convoluted tubule → cuboidal / low columnar epithelium
 - loop of Henle → low cuboidal to squamous cells
 - distal tubules → cuboidal and resemble those in the proximal tubules
- ◆ There is selective reabsorption of Na^+ , Cl^- , Water, Glucose, Amino acids, proteins, ascorbic acid, HCO_3^- in the proximal convoluted tubule
 - ◆ Site of action of ADH is at collecting duct causing water absorption
 - ◆ **Renal tubules :-**
 - Proximal convoluted tubule continuous into sinuous or coiled convoluted part - (pars convoluta)
 - It straightens and becomes the descending thick limb of the loop of Henle - (pars radiata) - The limbs are narrower and thin - walled as they traverse the deeper medullary tissue.

- The nephron finally straightens once more as the connecting tubule, which ends by joining a collecting duct.

272. (a) Skin

(Ref : I.B. Singh 4th/e pg 198, 3rd/e pg 195)

Blood vessels of the skin are derived from a number of arterial plexuses. The deepest plexus is present over the deep fascia. There is another plexus just below the dermis (rete cutaneum / reticular plexus)

- ◆ Third plexus just below the level of the dermal papillae (rete sub papillare (or) papillary plexus)
- ◆ Capillary loops arising from this plexus pass into each dermal papilla
- ◆ Blood vessels do not penetrate into the epidermis. The epidermis derives nutrition entirely by diffusion from capillaries in the dermal papillae.
- ◆ Veins from the dermal papillae drain (through plexuses present in the dermis) into a venous plexus lying on deep fascia
- ◆ A special feature of the blood supply of the skin is the presence of numerous arterio - venous anastomoses that regulate blood flow through the capillary bed and thus help in maintaining body temperature

273. None

(Ref : Gray's A 39th/e Renal - 1273, Splenic - 1243, Sinusoids - 143)

- ◆ The renal medulla consists of pale, striated conical renal pyramids, their bases peripheral, their apices converging to the renal sinus. At the renal sinus they project into calyces as papillae
- ◆ Venous sinusoids are elongated ovoid vessels 50 μm in diameter, lined by a characteristic, 'incomplete' endothelium, unique to the spleen.
- ◆ Sinusoids occurs in large numbers in the liver, spleen, bone marrow and suprarenal medulla

3rd Ed/ I.B. Singh - pg 172 Mentions:

Sinusoids are found typically in organs that are made up of cords & plates of cells. These include the liver, the adrenal cortex, the hypophysis cerebri and the parathyroid glands

Sinusoids are also present in the spleen, in the bone marrow and in the carotid body.

274. (a) Spindle shaped fibres

(b) Asynchrony

(Ref : Gray's Anatomy 39th/e pg 114)

- ◆ These cross - striations are usually evident in the sections stained conventionally, but may be demonstrated more effectively using

special stains

- ◆ Under polarised light, the striations are even more striking and are seen as pattern of alternating dark and light bands.
- The darker bands are birefringent, rotating the plane of polarised light strongly and are known as anisotropic (or) A- bands, the lighter bands rotate the plane of polarised light to a negligible degree and are known as isotropic (or) I- bands.
- ◆ The nuclei are moderately euchromatic and usually have one (or) more nucleoli. They occupy a thin transparent rim of sarcoplasm between the myofibrils and the sarcolemma and are most clearly seen in transverse section
- ◆ The cellular units of skeletal muscle are the muscle fibres. These long cylindrical structures tend to be consistent in size within a given muscle, but in different muscles may range from 10 to 100 μ m.

275. (d) Stratified squamous non - keratinised

(Ref : Gray's A 39th/e pg 703)

- ◆ The corneal epithelium covers the anterior surface of the cornea and generally has five layers of cells
- ◆ The deepest are columnar with flat bases and rounded apices, and large rounded (or) oval nuclei.
- ◆ Cells in the second layer are polyhedral and resemble those in the epidermal stratum spinosum
- ◆ In the more superficial layers the cells become progressively flatter. However, unlike the cells of the epidermis, they contain flat nuclei, are not normally keratinised, and present a smooth, optically perfect surface
- ◆ At the corneoscleral junction (limbus), the corneal epithelium merges with the limbal conjunctival epithelium which thickens (up to 12 cells) and soon loses the regular surface of the cornea
- ◆ It is of clinical significance that the cornea does not appear to possess epithelial stem cells
- ◆ Cell replacement depends on the centripetal migration from the edges of the cornea, of cells which are the progeny of mitotic limbal stem cells

276. (c) Urethro - vesical junction

(Ref : I.B. Singh, Histology, 4th/e pg 271)

The mucous membrane of the urethra consists of a lining epithelium that rests on connective tissue. The epithelium varies in different parts of the urethra

Both in the male and female the greater part of the urethra is lined by pseudostratified columnar epithelium. A short part adjoining the urinary bladder is lined by transitional epithelium while a part near the external orifice is lined by stratified squamous epithelium

277. (c) **Muscularis**

(Ref : I.B. Singh, Histology - 3rd/e pg 223)

The wall of the oesophagus is made up of following layers :- (from inner to outer side)

(A) The innermost layer is the mucous membrane which is made up of :

- (a) A lining epithelium
- (b) A layer of connective tissue, the lamina propria, that supports the epithelium
- (c) A thin layer of smooth muscle called the muscularis mucosae

(B) The mucous membrane rests on a layer of loose areolar tissue called the submucosa

(C) The gut wall derives its main strength and form because of a thick layer of muscle (muscularis externa) that surrounds the submucosa

(D) Covering the muscularis externa there is a serous layer (or) (alternatively) an adventitial layer

278. (a) **Simple squamous**

(Ref : I.B. Singh - 4th/e pg 44, 3rd/e pg 45)

♦ Squamous epithelium lines the alveoli of the lungs. it lines the free surface of the serous pericardium, of the pleura, and of the peritoneum, here it is called mesothelium

It lines the inside of the heart it is called endocardium and of blood vessels and lymphatics, where it is called endothelium

♦ Squamous epithelium is also found lining some parts of the renal tubules, and in some parts of the internal ear

279. (a) **Duodenum**

(Ref : I.B. Singh Histology- 4th/e pg 238, 3rd/e pg 233)

♦ The duodenum is easily distinguished from the jejunum (or) ileum because of the presence in it of glands in the submucosa.

♦ No glands are present in the submucosa of jejunum or ileum

♦ These duodenal glands of Brunner are compound tubulo-alveolar glands

♦ Their ducts pass through the muscularis mucosae to open into the intestinal crypts (of Lieberkühn)

♦ The alveoli of the duodenal glands are lined predominantly by mucous secreting columnar cells having flattened basal nuclei

♦ Some endocrine cells are also present. The duodenal glands are most numerous in the proximal parts of the duodenum. They are few (or) missing in the distal parts

♦ The secretions of the duodenal gland contains,
- mucous

- bicarbonate ions (to neutralize gastric acid entering the duodenum)
- and an enzyme that activates trypsinogen produced by the pancreas

280. (c) Liver

(Ref : I.B. Singh, Histology- 4th/e pg 251 & 3rd/e pg 240)

- ◆ The surface of the liver cell is separated from the endothelial lining of the sinusoid by a narrow perisinusoidal 'space of disse'. Microvilli present on the liver cells, extend into this space

281. (e) Pseudostratified

(Ref : I.B. Singh, Histology - 4th/e pg 208, 3rd/e pg 204)

- ◆ The olfactory mucosa is yellow in colour, in contrast to the pink colour of the respiratory mucosa
- ◆ It consists of a lining epithelium and a lamina propria
- ◆ The olfactory epithelium is pseudostratified. It is much thicker than the epithelium lining the respiratory mucosa (about 100 μ m)
- ◆ Within the epithelium there is a superficial zone of clear cytoplasm, below which there are several rows of nuclei
- ◆ Three types of cells are seen with special staining : -
 - (1) Olfactory cells are modified neurons - central part containing round nucleus and 2 processes, distal & proximal arising from this central part

282. (c) Sebaceous glands

(Ref : Gray's Anatomy 39th/e pg 34)

- | | |
|-------------------------|---|
| (1) Merocrine secretion | → Vesicle membranes fuse with the plasma membrane to release their contents to the exterior |
| (2) Apocrine glands | → Some of the apical cytoplasm is pinched off with the contained secretion which are stored in the cell as membrane - free droplets |

The best understood eg. the secretion of milk - fat by mammary gland cells in which a small amount of cytoplasm is incorporated into the plasma membrane bound lipid globule as it is released from the cell.

- (3) In Holocrine glands : e.g., sebaceous glands in the skin, the cells first fill with secretory products (lipid droplets (or) sebum, in this instance) and then the entire cell disintegrates to liberate the accumulated mass of secretion into the duct (or) hair follicle

Glands such as simple sweat glands of the skin, where ions and water are actively transported from plasma, were once classified as eccrine glands. They are now known to synthesize and secrete small amounts of protein by a merocrine mechanism, and are thus reclassified as merocrine glands

283. (d) Fibroelastic

(Ref : I.B. Singh, Histology - 4th/e pg 92, 3rd/e pg 90)

- ◆ On superficial examination this type of cartilage looks very much like dense fibrous tissue
- ◆ However in sections it is seen to be cartilage because it contains typical cartilage cells surrounded by capsules
- ◆ The matrix is pervaded by numerous collagen bundles amongst which there are some fibroblasts
- ◆ The fibres merge with those of surrounding connective tissue there being no perichondrium over the cartilage
- ◆ This kind of cartilage has great tensile strength combined with considerable elasticity
- ◆ The collagen in fibroelastic cartilage is different from that in hyaline cartilage in that it is Type I collagen (identical to that in connective tissue) and not Type II. The collagen fibres in the organic matrix of bones is also (Type I collagen)
- ◆ Since no other cartilages have this collagen it is the fibroelastic cartilage which ossifies most commonly

284. (c) Liver

(Ref : I.B. Singh, Histology, 4th/e pg 251 & 3rd/e pg 240)

- ◆ The liver cells are arranged in the form of anastomosing plates, one cell thick, and that the plates form a network in the spaces of which sinusoids lie
- ◆ In this way each liver cell has a sinusoid on two sides
- ◆ The sinusoids are lined by an endothelium in which there are numerous pores. A basement membrane is not seen
- ◆ Interspersed amongst the endothelial cells there are hepatic macrophages (kupffer cells)

285. (a) Auditory tube

(Ref : Gray's Anatomy 39th/e pg 86)

- ◆ Elastic cartilage occurs in the external ear, corniculate cartilages, epiglottis and apices of arytenoids. It contains typical chondrocytes, but its matrix is pervaded by yellow elastic fibres, except around lacunae (where it resembles) typical hyaline matrix with fine type II collagen fibres
- ◆ Most sites where elastic cartilage occurs have vibrational functions

Joints

Questions

- 286. The example of syndesmosis type of joint is (AP 91)**
- a. Sacroiliac
 - b. Inferior tibiofibular
 - c. Superior tibiofibular
 - d. Mid-tarsal
- 287. Manubriosternal joint is (Kerala 96)**
- a. Saddle type
 - b. Ball & socket
 - c. Symphysis
 - d. Syndesmosis
- 288. Which of the following is an example of saddle joint - (CUPGEE 95)**
- a. Carpo- metacarpal joint of the thumb
 - b. Elbow joint
 - c. Ankle joint
 - d. Knee joint
- 289. Example of ellipsoid joint is - (Kerala 96)**
- a. Wrist
 - b. Knee
 - c. Ankle
 - d. Shoulder
- 290. Vomero - sphenoidal rostrum junction is - (Orissa 2K)**
- a. Syndesmosis
 - b. Synostosis
 - c. Schindylesis
 - d. Gomphosis
- 291. Joint between epiphysis and diaphysis of a long bone is a type of (AIIMS 04)**
- a. Plain synovial joint
 - b. Fibrous joint
 - c. Symphysis
 - d. Synchondrosis

Joints

Answers

286. .(b) Inferior tibiofibular

(Ref : Gray's Anatomy , 39th/e pg 105)

"A syndesmosis is fibrous articulation in which bony surfaces are bound together by an interosseous ligament, a slender fibrous cord or an interosseous ligament, a slender fibrous cord or an aponeurotic membrane, which allows slight, but occasionally, more extensive, movement between them.

The term was at one time restricted to inferior tibiofibular joint alone. Though not usually so described, the dorsal part of the sacroiliac junction, through its massive interosseous sacroiliac ligaments, is a syndesmosis.

Sacroiliac joints proper, primarily synovial, are also often invaded by fibrous tissue late in life and may become entirely fibrous articulations, differing little from syndesmosis."

But since in a single best response exam, inferior tibiofibular joint is the best choice.

287. (c) Symphysis

(Ref : Gray's Anatomy, 39th/e pg 106)

Topographically, all symphysis are median and, with one exception, are confined to the axial skeleton

They include the following named joints :-

(1) Manubriosternal is (between manubrium and sternal body)

(2) Intervertebral is (between successive vertebral bodies, these are regionally grouped into cervical, thoracic, lumbar, sacral & coccygeal)

(3) Symphysis menti - between the bilateral halves of the fetal mandible (which continues only into the first post natal year, when synostosis supervenes)

(4) Symphysis pubis - between the medial surfaces of the bodies of the pubes

288. (a) Carpo- metacarpal joint of the thumb

(Ref : Gray's Anatomy 39th/e pg 112)

SADDLE (SELLAR) JOINTS :-

♦ They are biaxial and have concavo-convex surfaces

- ◆ Each is most convex in a particular direction and is maximally concave at right angles to this direction
- ◆ The convexity of the larger surface is apposed to the concavity of the smaller surface and vice - versa
- ◆ Primary movement occurs in two orthogonal planes, but articular shape causes axial rotation of the moving bone
- ◆ Such coupled rotation is never independent and is functionally significant in habitual positioning and limitation of movement.
- ◆ The most familiar sellar joint is the carpometacarpal joint of the thumb, others include (2) Ankle (3) Calcaneocuboid joints

289. (a) Wrist

(Ref: Gray's Anatomy 39th/e pg 112)

Ellipsoid joints :-

- ◆ Biaxial
- ◆ Consist of an oval, convex surface apposed to an elliptical concavity, eg. radiocarpal and metacarpal joints (wrist)
- ◆ Primary movement are about 2 orthogonal axes. eg flexion-extension, abduction - adduction which may be combined as circumduction
- ◆ Rotation around the third axis is largely prevented by general articular shape

290. (c) Schindylesis

(Ref : Gray's Anatomy, 39th/e pg 105)

A schindylesis is a specialised suture where a ridged bone fits into a groove on a neighboring element, e.g, the cleft between the alae of the vomer, which receives the rostrum of sphenoid

291. (d) Synchondrosis

(Ref : Gray's Anatomy 39th/e pg 105)

- ◆ Synchondrosis occurs where originally separate, but adjacent centres of ossification appear within a continuous mass of hyaline cartilage.
- ◆ Extreme examples are synchondrosis between the diaphysis and terminal epiphysis of long bones, where growth and progressive ossification are mainly (but not exclusively) diaphyseal. In the latter, the quiescent zone lies near the epiphyseal bone, and the ossification zone extends between towards the diaphysis.

Embryology

Questions

292. Hofbauer cells are associated with - (AIIMS 78, 83)

- a. Single umbilical artery
- b. Maternal diabetes
- c. Early pregnancy
- d. Erythroblastosis fetalis

293. Renal agenesis is because of all except - (AI 97)

- a. Defective development of nephric tissue
- b. Failure of ureteric bud with metanephros
- c. Failure of ascent of primitive
- d. All of the above

294. Tonsils develop embryologically from - (PGI 88)

- a. First pharyngeal pouch
- b. Second pharyngeal pouch
- c. Third pharyngeal pouch
- d. Fourth pharyngeal pouch

295. A persistent left superior vena cava usually drains into the - (JIPMER 81, PGI 85)

- a. Right atrium
- b. Inferior vena cava
- c. Coronary sinus
- d. Right superior vena cava

296. Cleft lip is due to non fusion of - (AIIMS 92)

- a. Maxillary process with lateral nasal process
- b. Maxillary process with medial nasal process
- c. Maxillary process with mandibular process
- d. All of the above

297. Uterus develops from - (AIIMS 75)

- a. Mullerian duct
- b. Wolffian duct
- c. Both
- d. None

- 298. Which of the following is derived from cartilage of the third arch - (JIPMER 78, AP 89)**
- a. Styloid process
 - b. Malleus
 - c. Incus
 - d. Greater cornua of hyoid
- 299. Patent foramen ovale is due to failure of fusion of - (AIIMS 80, JIPMER 92)**
- a. Ostium primum with endocardial cushion
 - b. Ostium primum with ostium secundum
 - c. Ostium primum with septum primum
 - d. Ostium primum with mitral valve
- 300. Umbilical cord has - (PGI 86,87, Andhra 86, Kerala 88, TN 89, AIIMS 89, PGMHCET 06)**
- a. 2 artery and 1 vein
 - b. 1 artery and 2 vein
 - c. 2 artery and 2 vein
 - d. Only one artery
- 301. Urachal fistula results from - (JIPMER 81, AMU 84)**
- a. Ectopic urethra
 - b. Ectopic ureter
 - c. Ectopic vesicae
 - d. Persistent vitellointestinal duct
 - e. Persistent allantois
- 302. Which of the following is not a derivative of mesoderm - (AIIMS 81, AP 80)**
- a. Ureter
 - b. Gall bladder
 - c. Uterus
 - d. Epididymis
- 303. Uro rectal septum separates the cloaca into (AIIMS 84)**
- a. Rectum and bladder
 - b. Anus and urethra
 - c. Allantois and bladder
 - d. Rectum and urogenital sinus

304. The reduction of the physiological hernia occurs at - (JIPMER 84, PGI 86, AIIMS 84)

- a. 6th week
- b. 7th week
- c. 10th week
- d. 12th week
- e. 20th week

305. Testes descend into the scrotum during - (AIIMS 86, 85, UPSC 85)

- a. 6th month
- b. 7th month
- c. End of 8th month
- d. 9th month
- e. 10th month

306. Genital swellings in the male differentiate into - (AIIMS 85)

- a. Glans penis
- b. Penile urethra
- c. Ischiocavernosus of penis
- d. Scrotum
- e. No adult structure

307. The first teeth to appear in an infant is - (PGI 86,87, UPSC 86, Kerala 86)

- a. Upper incisors
- b. First molar
- c. Canine.
- d. Lower central incisor
- e. Second molar

308. Structures derived from neural crest are - (Kerala 87, PGI 86, AIIMS 86, AI 88)

- a. Pia
- b. Dental papillae
- c. Adrenal medulla
- d. Schwann. cells
- e. All of the above

309. Malleus and incus are derived from - (TN 87)

- a. First arch
- b. Second arch
- c. Third arch'
- d. Fourth arch

218 Anatomy

- 310.** The most important structure involved in the development of inferior vena cava is - (AIIMS 87)
- a. Supracardinal vein
 - b. Umbilical vein
 - c. Subcardinal vein
 - d. Anterior cardinal vein
 - e. Posterior cardinal vein
- 311.** Double barr body is seen in ___ syndrome (AI 89)
- a. Turners
 - b. Klinefelters
 - c. XXX
 - d. Downs
- 312.** Ligamentous arteriosus is a remnant of - (TN 89)
- a. Ductus arteriosus
 - b. Ductus caroticus
 - c. Ductus venosus
 - d. None
- 313.** Germ cells in the ovary develop from - (AP 89, AI 93)
- a. Coelomic endoderm
 - b. Trophoblastic layer
 - c. Yolk sac
 - d. Surface ectoderm
- 314.** Ossification centres for all carpal bones is found by - (AP 89)
- a. 12th year
 - b. 2nd year
 - c. 3rd year
 - d. 5th year
- 315.** Somatic afferent columns arise from which part of Neural crest - (Kerala 91)
- a. Antrum
 - b. Alar lamina
 - c. Basal plate
 - d. Roof
- 316.** Which is not derived from ectoderm - (JIPMER 91)
- a. Sclera of eye
 - b. Sweat gland
 - c. Skin
 - d. Distal part of anus

- 317. Endoderm forms which of the following - (JIPMER 91)**
- a. Liver parenchyma
 - b. Trigone of bladder
 - c. Cells lining renal tubules
 - d. Cells of fallopian tubes
- 318. The collecting tubules of the kidney is derived from - (JIPMER 91, AIIMS 91)**
- a. Mesonephros
 - b. Metanephros
 - c. Mullerian duct
 - d. Ureteric bud
- 319. Skeletal element of second branchial arch - (PGI 93)**
- a. Malleus
 - b. Incus
 - c. Meckels cartilage
 - d. Stapes
- 320. Regarding zona pellucida what is wrong? (AIIMS 94)**
- a. Acellular
 - b. Contain glycoprotein
 - c. Surrounds morula
 - d. Surrounds ovum
- 321. In embryo the inner cell mass forms the (AIIMS 94)**
- a. Embryonic disc
 - b. Extra embryonic mesoderm
 - c. Chorion
 - d. Allantois
- 322. Thymus develops from - (Kerala 94)**
- a. 4th arch
 - b. 2nd arch
 - c. 3rd pouch
 - d. 6th pouch
- 323. Somites develop from - (TN 95)**
- a. Notochord
 - b. Intermediate mesoderm
 - c. Paraxial mesoderm
 - d. Lateral plate mesoderm

220 Anatomy

- 324. Umbilical vein assumes which of the following positions after birth - (Assam 95)**
- a. Ligamentum teres
 - b. Urachus
 - c. Medial umbilical ligament
 - d. Lateral umbilical ligament
- 325. Proximal convoluted tubules develops from - (JIPMER 98)**
- a. Mesonephric duct
 - b. Metanephric duct
 - c. Mesonephric tubules
 - d. Ureteric buds
- 326. The structure derived from the right fourth aortic arch - (TN 98)**
- a. Right common carotid artery
 - b. Right subclavian artery
 - c. Aortic arch
 - d. None of the above
- 327. Corona Radiata of ovum is formed from - (AI 98)**
- a. Cummulus ovaricus
 - b. Zona pellucida
 - c. Formative yolk
 - d. Follicular cells
- 328. All are endodermal in origin except - (MP 2K)**
- a. Hepatocyte
 - b. Odontoblast
 - c. Alveolar lining cells
 - d. None
- 329. Melanocytes appear in basal layer of epidermis during - (ICS 2K)**
- a. 3rd month of intra uterine life
 - b. 5th month of intra uterine life
 - c. 7th month of intra uterine life
 - d. 8th month of intra uterine life
- 330. Midline cleft lip is due to failure of fusion of - (Kerala 01)**
- a. Two medial nasal processes
 - b. Medial and lateral nasal processes
 - c. Two lateral nasal processes
 - d. Any of the above

331. Notochord develops in - (NIMHANS 01)

- a. 3rd week
- b. 3rd month
- c. 6 months
- d. 10th week

332. Exomphalos is a disease involving - (PGI 2001)

- a. Umbilicus
- b. Cervix
- c. Abdominal wall
- d. Urinary bladder

333. True about gastrulation is - (AI 2002)

- a. Process involving rotation of gastro intestinal tract
- b. Process by which 3 germinal layers form
- c. Occurs in 4th week of gestation
- d. Involves hypoblastic inner cell mass

334. The membranous part of the atrio ventricular part of interventricular septum is between - (JIPMER 2002)

- a. RA & LV
- b. LA & RV
- c. RA & RV
- d. LA & LV

335. At 30 days intra uterine life - (NIMHANS 2002)

- a. Heart starts beating
- b. Cerebellum develops
- c. Optical vesicle appears
- d. Pinna appears

336. Interventricular septum is formed by which of the following - (PGI 2002)

- a. Truncus septum
- b. Conus septum
- c. Septum spurium
- d. Endocardial cushion
- e. Bulbar septum

337. In a female child at birth oocyte is in a stage of (PGI 2000)

- a. Anaphase 2nd meiotic
- b. Prophase 1st meiotic
- c. Oogony
- d. Maturation

338. In the testis, haploid number of chromosomes are present in - (UPSC 02)
- a. Spermatogonia - type A
 - b. Primary spermatocytes
 - c. Spermatids
 - d. Spermatogonia - Type B
339. Meiosis occurs in human males in - (AIIMS 04)
- a. Epididymis
 - b. Seminiferous tubules
 - c. Vas deferens
 - d. Seminal vesicles
340. Anterior neuropore closes on - (Orissa 04)
- a. 16 days
 - b. 24 days
 - c. 28 days
 - d. 8 days
341. All are ectodermal in origin except - (Kerala 04)
- a. Cerebellum
 - b. Anal canal
 - c. Sebaceous glands
 - d. Bone marrow
342. Clitoris develops from - (Maharashtra 02)
- a. Genital tubercle
 - b. Genital ridge
 - c. Wolffian duct
 - d. Mullerian duct
343. Incomplete closure of the ectodermal cleft in known to cause - (SGPGI 04)
- a. Retinal detachment
 - b. Iridodonesis
 - c. Retinoblastoma
 - d. Coloboma of iris

Embryology

Answers

292. (c) Early pregnancy

(Ref : Gray's Anatomy 39th/e pg 1340, 1346)

- Pg - 1340 - The chorion at term consists of an inner cellular layer containing fibroblasts and a reticular layer of fibroblasts and Hofbauer cells, which resembles the mesenchyme of an intermediate villus
- Pg 1346 - The core of a villus contains small and large reticulum cells, fibroblasts and large phagocytic Hofbauer cells, which are more numerous in early pregnancy.

293. (c) Failure of ascent of primitive

(Ref : Gray's Anatomy 39th/e pg 1379)

- ◆ Anomalies of the urinary system are relatively common (3% of live births). Renal agenesis is the absence of one (or) both kidneys. In unilateral agenesis, the remaining kidney exhibits compensatory hypertrophy and produces a nearly normal functional mass of renal tissue
- ◆ Problems with kidney ascent can result in pelvic kidney, Alternatively the kidneys may fuse together at their caudal poles producing a horse shoe kidney, which cannot ascend out of the pelvic cavity because the inferior mesenteric artery prevents further migration.

294. (b) Second pharyngeal pouch

(Ref : Gray's Anatomy 39th/e pg 614)

- ◆ The palatine tonsils develop from the ventral parts of the second pharyngeal pouches
- ◆ A slit like intratonsilar cleft extends into the upper part of the tonsil and is possibly a remnant of the second pharyngeal pouch
- ◆ The paired palatine tonsils are situated slightly higher in the tonsillar fossae in the neonate than in the adult. Each descends in the 2nd & 3rd postnatal year, but definitive lymph nodes appear after birth

295. (c) Coronary sinus

(Ref : Gray's anatomy 39th/e pg 1049, 1050)

- ◆ Either the systemic (or) pulmonary veins can be anomalously connected
- ◆ The most common systemic anomaly is found when a persistent left superior vena cava drains into the right atrium through the enlarged orifice of the coronary sinus
- ◆ More rarely the left vena cava may connect directly with the superior aspect of left atrium, usually associated with the unroofing of the coronary sinus, so that the orifice of the sinus functions as an interatrial communication
- ◆ The most common lesion of the inferior vena cava is when its abdominal course is interrupted, with drainage to the heart via the azygos or hemiazygos venous system. This lesion is found most frequently with left isomerism

296. (b) Maxillary process with medial nasal process

(Ref : Gray's Anatomy 39th/e pg 614)

"Failure of local fusion of one maxillary process with the corresponding premaxillary region, leading to a persistent fissure between the philtrum and lateral part of the upper lip on that side, is called a cleft lip"

- ◆ If the palatal shelves fail to fuse across the midline with the nasal septum, a cleft palate is produced
- ◆ Failure of fusion of the maxillary process with the adjacent lateral nasal process will lead to a cleft face"

297. (a) Mullerian duct

(Ref : Gray's Anatomy 39th/e pg 1384)

- ◆ At the end of the indifferent stage each paramesonephric duct (Mullerian duct) consists of a vertical cranial and caudal parts and an intermediate horizontal region
- ◆ In the female the mesonephric duct is vestigial. Cranially it becomes the longitudinal duct of the epoophoron, while caudally it is referred to as Gartner's duct
- ◆ The cranial part of the paramesonephric ducts forms the uterine tubes, and the original coelomic invagination remains as the pelvic opening of the tube
- ◆ The fimbriae become defined as the cranial end of the mesonephros degenerates
- ◆ The caudal vertical parts of the two ducts fuse with each other to form the uterovaginal primordium
- ◆ This gives rise to the lower part of the uterus and as it enlarges, it takes in the horizontal parts to form the fundus and most of the body of the adult uterus

298. (d) Greater cornua of hyoid

(Ref : Gray's Anatomy 39th/e pg 450)

"The ventral cartilage of the third arch becomes the greater cornua of the hyoid bone and the caudal part of the body of the hyoid"

Pg 452 - Skeletal derivatives (Osseous & cartilaginous) of the pharyngeal arches

Arch 1 - Maxillo mandibular :

Palatopterygoquadrate and Meckel's cartilages

Arch 2 - Hyoid - Parotic and Reichet's cartilage

Arch 3 - Greater cornua of Hyoid and lower part of the body of the Hyoid

Arch 4 - Probably accessions from arch 5.

Thyroid cartilage

Arch 5 - Arytenoid cartilage

The final adaptations of the cartilage of the skeletal elements in the sixth arches are a source of disagreement.

299. None

(Ref : Gray's Anatomy 39th/e pg 1001)

It is due to failure of fusion of septum primum with septum secundum

- ◆ The septal (atrial) wall presents the fossa ovalis, an oval depression above and to the left of the orifice of the inferior vena cava
- ◆ It's floor is the primary atrial septum, the septum primum
- ◆ A small slit is sometimes found at the upper margin of the fossa, ascending beneath the rim to communicate with the left atrium
- ◆ This represents the failure of obliteration of the fetal foramen ovale, which remains patent in up to one-third of all normal hearts.
- ◆ Pg 1040 - A persistent communication between the atrial chambers within the fossa ovalis is common, and results from failure of fusion of the primary atrial septum (the flap valve (or) septum primum) with the infolded muscular rims of the fossa (which is formed by septum secundum, see fig 61.5 pg 1034)
- ◆ Congenital cardiac malformations are often multiple and probably occur more frequently in siblings and in children of consanguineous marriages
- ◆ There is low correlation, however, among monozygotic twins
- ◆ Ventricular septal defects are the most common lesions, making up to 20% of all cases followed by persistent patency of the ductus arteriosus, co-arctation, pulmonary stenosis, fallot's tetralogy, complete transposition, aortic stenosis and hypoplastic left heart syndrome (each of these accounts for between 5 and 10% of all cases)

300. (a) 2 arteries and 1 vein

(Ref : Gray's Anatomy 39th/e pg 1259)

- ◆ The mesenchymal core of the umbilical cord is derived by coalescence from somatopleuric amniotic mesenchyme, splanchnopleuric allantoic (connecting stalk) mesenchyme
- ◆ These various layers become fused and are gradually transformed into the viscid, mucoid connective tissue (wharton's jelly) which characterizes the more mature cord
- ◆ The changes in the circulatory system result in a large cranially oriented left umbilical vein (the right umbilical vein regresses), and two spirally disposed umbilical arteries

301. (e) Persistent allantois

(Ref : Gray's Anatomy 39th/e pg 1259)

- ◆ The cranial end of the allantois becomes thinned and its lumen is partially obliterated, and it forms the urachus.
- ◆ Pg - 1341 - The allantois is a site of angiogenesis which gives rise to the umbilical vessels and placental circulation. The extraembryonic mesenchyme around the allantois forms the connecting stalk, which is later incorporated into the umbilical cord.
- ◆ In the fetus, the allantoic duct, which is confined to the proximal end of the umbilical cord, elongates and thins
- ◆ However it may persists as an interrupted series of epithelial strands at term, in which case the proximal strand is often continuous at the umbilicus with the median intra-abdominal urachus, and this in turn continues into the apex of the bladder.

302. (b) Gall bladder

(Ref : Gray's Anatomy 39th/e pg 1255)

"In the stage 11 embryo, the location of the hepatic endoderm has been identified at the superior boundary of the rostral intestinal portal. By stage 12, the hepatic endodermal primordium is directed ventrally and begins to proliferate as a diverticulum.

There are two parts : a caudal part : which produce the cystic duct and gall bladder, and a cranial part which forms the liver, biliary system

Pg 208 fig 10.28

- ◆ Structures that will be derived from specific epithelial and mesenchymal populations in the early embryo

Coelomic wall epithelium

- (a) Walls of Intra embryonic coelome
- (b) Primitive pericardium
- (c) Pericardioperitoneal canals
- (d) Primitive peritoneal cavity
- ◆ Splanchnopleuric epithelium
 - Visceral peritoneal covering of mid and hind gut
 - The mesentery

- transverse and sigmoid colon
 - ♦ Pronephros
 - ♦ Epithelial lining of mesonephric ducts
 - ♦ Vas deferens
 - ♦ Epididymis
 - ♦ Seminal vesicles
 - ♦ Ejaculatory ducts
 - ♦ Ureters
 - ♦ Vesical trigone
 - ♦ Mullerian ducts
 - ♦ Epithelial lining of uterine tubes
 - ♦ Body and cervix of uterus
 - ♦ Vagina
 - ♦ Broad ligament of uterus
 - ♦ Germinal epithelium of gonad
 - ♦ Germinal epithelium forming cortex of suprarenal gland
- Somatopleuric epithelium
- ♦ Parietal peritoneum
 - ♦ Tunica vaginalis of testis

Mesenchyme

Intermediate mesenchyme :-

Connective tissue of gonads, mesonephric and metanephric nephrons, smooth muscle and connective tissues of the reproductive tracts.

Septum transversum :-

- ♦ Epicardium
- ♦ Fibrous pericardium
- ♦ Portion of diaphragm
- ♦ Oesophageal mesentery
- ♦ Sinusoids of liver
- ♦ Tissue within lesser omentum
- ♦ Falciform ligament

303. (d) Rectum and urogenital sinus

(Ref : Gray's 39th/e pg 1260)

- ♦ "Proliferation of the mesenchyme and endoderm in the angle of the junction of hindgut and allantois produces a urorectal septum
- ♦ Continued proliferation of the urorectal septum and elongation of the endodermal structures thrusts the endodermal epithelium towards the cloacal membrane with which it fuses centrally, separating the presumptive rectum and upper anal canal (dorsally) from the presumptive urinary bladder and urogenital sinus (ventrally)"
- ♦ The cloacal membrane is thus divided into anal (dorsal) and urogenital (ventral) membranes.

304. (d) 12th week

(Ref : Gray's Anatomy 39th/e pg 1256, Pg 213 Fig 11.2)

By the time the fetus has attained a length of 40mm (10 weeks), the peritoneal cavity has enlarged and the relative size of the liver and the mesonephros is much less.

The re-entry of gut occurs rapidly and in a particular sequence during which it continues to the process of rotation.

The proximal loop returns first, with jejunum mainly on the left and the ileum mainly on the right of the subhepatic abdominal cavity

The caecum is last to re-enter

Pg 213 - The midgut loop returns to abdomen by 12th week post-ovulation, length being 55mm

305. None Correct; answer is just before birth though it approaches scrotum in ninth month

(Ref : Gray's Anatomy 39th/e pg 212)

"Just before birth, the lanugo almost disappears, the umbilicus is central, and the testes, which begin to descend with the processus vaginalis of peritoneum during the **seventh month** and are approaching the scrotum in the **ninth month**, are usually scrotal in position".

Pg 1389 - The caudal pole of the testis is retained in apposition with the deep inguinal ring by the gubernaculum during the sixth and seventh months.

The testes finally descends into the scrotum before birth, the left testes usually migrating ahead of the right.

In full term male neonates, 90% have descended testes".

306. (d) Scrotum

(Ref : Gray's Anatomy 39th/e pg 1394)

The scrotum is formed by proliferation of the genital swellings, which are the anchoring points of the gubernaculum testis

The genital swellings fuse across the midline covering the base of the penis

- ◆ The testes descends into scrotum prior to birth
- ◆ In the neonate the penis and scrotum are relatively large
- ◆ Both the septum and the walls of the scrotum are relatively thicker than in adults

307. (d) Lower central incisor

(Ref : Gray's Anatomy 39th/e pg 593 table 33.2)

Only deciduous teeth are enumerated below :-

Dentition	Tooth	First evidence of calcification (weeks in utero)	Eruption (months)
Deciduous Upper	i1	14	10 (8-12)
	i2	16	11 (9-13)
	C	17	19 (16-23)
	m1	15 1/2	16 (13-19)
	m2	19	29 (25-33)
Deciduous Lower	i1	14	8 (6-10)
	i2	16	13 (10-16)
	C	17	20 (17-23)
	m1	15 1/2	16 (14-18)
	m2	18	27 (23-31)

308. (e) All of the above

(Ref : Gray's Anatomy 39th/e pg 208 Fig 10.28)

Neural crest

Neural derivatives

Mesenchymal derivatives in the head

- Sensory neurons of the cranial ganglia V, VII, VIII, IX, X.
- Sensory neurons of the spinal dorsal root ganglia and their peripheral sensory receptors
- Satellite cells in all sensory ganglia
- Parasympathetic ganglia, and plexuses : neurons and satellite cells
- Enteric plexuses : Neurons & glial cells
- Schwann cells of all the peripheral nerves
- Frontal, parietal, squamous temporal, nasal, vomer, palatine bones, maxillae and mandible etc..
- Meninges
- Choroid and sclera of eye
- Connective tissue of lacrimal, nasal, labial, palatine, oral and salivary glands
- Dentine of teeth
- Connective tissue of head, including cartilage, ligaments and tendons

230 Anatomy

- Medulla of suprarenal glands :
Chromaffin cells
- Connective tissues of thyroid gland and of the pharyngeal pouches, i.e. parathyroid glands, thymus
- Carotid body type I cells
(and type II satellite type cells)
- Tunica media of the outflow medial of the outflow tract of heart and great vessels
- Calcitonin producing 'C' cells
- Melanocytes

309. (a) First arch

(Ref : Gray's Anatomy 39th/e pg 450)

First arch (on each side)

Dorsal cartilage Represents the
- Palatopterygoquadrate bar

Ventral (Meckel's) cartilage
extends from the developing
middle ear into the
mandibular prominence,
where it meets its fellow at its
ventral end

- Its dorsal end, which
becomes separated, was
once thought to form the
rudiments of both malleus
and incus

However there is strong paleontological and comparative anatomical evidence that atleast a part of the incus should be regarded as a homologue of the quadrate bone of reptiles. It is therefore correct to consider incus to be a derivative of the palatopterygoquadrate cartilage, which may also contribute to the greater wing of sphenoid bone and to the roots of its pterygoid plates.

♦ The intermediate part of Meckel's cartilage disappears, while its sheath persists as the anterior malleolar and sphenomandibular ligaments.

310. (a) Supracardinal vein

(c) Subcardinal vein

(Ref : Gray's Anatomy 39th/e pg 1049)

♦ In summary, the inferior vena cava is formed from below upwards by the confluence of :

- ◆ The common iliac veins
- ◆ A short segment of the right post cardinal vein
- ◆ The post cardinal - supracardinal anastomosis
- ◆ Part of the right supracardinal vein
- ◆ The right supra cardinal - subcardinal anastomosis
- ◆ The right sub-cardinal vein
- ◆ A new anastomotic channel of double origin the hepatic segment of the I.V.C.
- ◆ The cardiac termination of the right vitelline hepatocardiac vein (common hepatic vein)

311. (c) XXX

(Ref : Shaw's Textbook of Gynaecology 13th/e pg 100, 101)

(Gray's 39th/e pg 22)

- ◆ The inactive X - chromosome in females is an example of facultative heterochromatin and can be identified in the light microscope as the deeply staining Barr body (drumstick chromosome) that projects from the nuclear periphery

Shaw's - In explanation of Turner's syndrome, which is 45 0X. It says the nucleus possesses only 45 chromosomes i.e. 22 pairs of autosomes plus a sex chromosome 0X.

The absence of Y chromosome resembles the female but these patients are, like males, chromatin negative. i.e their nuclei contain no nuclear satellite body and no drumsticks in the neutrophils

It should be explained here that the presence of a Barr body is dependent upon the presence of a second X chromosome and if the chromosome pattern is XXX or XXXY, the extra X-complement tends the eccentric chromatin nodule either larger in size (or) in number.

312. (a) Ductus arteriosus

(Ref : Gray's 39th/e pg 1053)

Closure of Ductus arteriosus :-

- ◆ Starts immediately after birth
- ◆ Blood probably continues to flow intermittently through it for a week or so
- ◆ This flow is severed due to:
 - (clamping of cord) and increase in systemic vascular resistance that results from exclusion of the placental circulation
 - decrease in pulmonary resistance due to expansion of lungs
 - Initial constriction at birth has been attributed to increased oxygen tension
- A neural factor may also be involved
- ◆ The first stage of ductal closure is completed within 10-15 hours and second stage takes 2-3 weeks

Factors involved in closure :-

- ◆ Increased O₂ tension
- ◆ Increased plasma catecholamine concentration
- ◆ Suppression of PGI₂ production
- ◆ A synergistic role of PGF₂α and O₂ concentrations and a decrease in plasma adenosine concentration
- ◆ It has been proposed that high O₂ tension of the reversed blood flow through the ductus initiates the synthesis of a hydroperoxy fatty acid that suppresses prostacyclin production thus exposing the ductus to the contractile effects of prostaglandin endoperoxide
- ◆ After closure, the duct becomes the ligamentum arteriosum, which connects the left pulmonary artery (near its origin) with the aortic arch

313. None - Correct answer is epiblast ingressing at the caudal portion of primitive streak, though surface ectoderm is derived from epiblast, Germ cells per se are not derived from it

- ◆ The earliest stage of reproductive development, prior to the arrival of primordial germ cells into the gonad, is termed the indifferent (or) ambisexual stage - (Pg 1381 Gray's 39th/e)
- ◆ Up to the seventh week (7th) the ambisexual gonad possesses no sexually differentiating feature. From stage 16, the proliferating coelomic epithelium forms a number of cellular epithelial cords (sometimes called primary sex cords) separated by mesenchyme
- pg 1382
- ◆ Pg 196 - Although early studies on human embryos have reported primordial germ cells, and described their development from yolk sac and allantois, it is now clear from animal experimentation that the primordial germ cells arise from epiblast ingressing at the caudal end of the primitive streak
- ◆ It has been suggested that the primordial germ cells remain sequestered in the extra embryonic mesenchyme at the caudal end of the embryo until the embryonic endoderm has been produced and gastrulation completed, and that they start to migrate along the allantoic and hind gut endoderm as the folding of the embryo begins
- ◆ The formation of the tail fold brings the proximal portion of the allantois within the body, so reducing the final distance over which the cells migrate to the genital ridges
- ◆ Pg - 136 - In the histological sections of ovaries from 3rd and subsequent months, the epithelial cells, separated by fine septa of undifferentiated mesenchyme. An ovarian rete condenses in the medullary mesenchyme and some of its cord may join mesonephric glomeruli. The medulla subsequently regresses,

and connective tissue and blood vessels from this region invade the cortex to form the ovarian stroma

During this invasion the clusters of epithelial cortical cells break into individual groups of supporting cells (now identified as granulosa cells) which surround the primordial germ cells (now identified as primary oocytes)

314. (a) 12th year

(Ref : Gray's Anatomy 39th/e pg 897 & 898)

- ◆ Carpal bones are cartilaginous at birth
- ◆ Although ossification may have started in capitate and hamate
- ◆ Each carpal bone ossifies from one centre
- ◆ Capitate - 1st and Pisiform - last
- ◆ The order in the others varies as follows :
 - Capitate - 2nd month
 - Hamate - End of 3rd month
 - Triquetrum- 3rd year
 - Lunate
 - Scaphoid] 4th year in females and 5th year in males
 - Trapezium
 - Trapezoid
 - Pisiform - 9th (or) 10th year in females; 12th year in males

315. (b) Alar lamina

(Ref : Gray's 39th/e pg 257)

Pg 256

Under rhombencephalon :-

"The differentiation of the lateral walls of the hindbrain into basal (ventrolateral) and alar (dorsolateral) plates has a similar significance to the corresponding differentiation in the lateral wall of the spinal cord, and ventricular, intermediate and marginal zones are formed in the same way"

(for derivatives of Neural crest see Q. 310)

so

Lateral wall of Hindbrain

Basal plate (Ventrolateral)

Alar plate (lamina dorsolateral)

Cell columns of the Alar plate (dorsolateral lamina)

Cell columns of the alar plate are interrupted and give rise to :-

- (1) Visceral (general splanchnic) afferent
- (2) Special visceral (Special splanchnic) afferent
- (3) Special somatic afferent nuclei
- (4) General somatic afferent

- ◆ The general visceral afferent represented by → part of dorsal nucleus of vagus
- ◆ The special visceral afferent represented by → Nucleus of tractus solitarius
- ◆ The general somatic afferent column → afferent nuclei of trigeminal nerve
- ◆ The special somatic afferent column → Nuclei of vestibulocochlear nerve

316. (a) Sclera of eye

(Ref : Gray's Anatomy 39th/e pg 208, Table 10.28)

Surface Ectoderm

Ectodermal placodes

- ◆ Adenohypophysis
- ◆ Cranial sensory ganglia of nerves V, VII, VIII, IX, X
- ◆ Olfactory receptor cells and olfactory epithelium
- ◆ Epithelial walls of the membranous labyrinth, the cochlear organ of corti
- ◆ Lens of the eye
- ◆ Enamel organs of teeth

Cranial structures :-

- ◆ Secretory and duct - lining cells of the lacrimal, nasal, labial, palatine, oral and salivary glands
- ◆ Epithelia of the cornea and conjunctiva
- ◆ Epithelial lining of external acoustic meatus and external epithelium of the tympanic membrane
- ◆ Epithelial lining of the lacrimal canaliculi and naso lacrimal duct
- ◆ Epithelial lining of paranasal sinuses, lips, cheeks, gums and palate

Epidermal structures

- ◆ Most of the cutaneous epidermal cells, the secretory, duct lining and myoepithelial cells of the sweat, sebaceous and mammary glands
- ◆ Hair and nails
- ◆ Proctodeal epithelium and epithelium of the terminal male urethra
- ◆ Retina and optic nerve, epithelium of the iris, ciliary body and processes, are derived from Neural plate epithelium

Choroid and sclera (Pg 723 Gray's A)

- ◆ The choroid and sclera differentiate as inner vascular and outer fibrous, layers from the mesenchyme that surrounds the optic cup
- ◆ The blood vessels of the choroid develop from the ciliary body
- ◆ The choroid is continuous with the internal sheath of the optic nerve which is pia- arachnoid mater, and the sclera is continuous with the outer sheath of the optic nerve, and thus with the dura mater

317. (a) Liver parenchyma

(Ref : Gray's Anatomy 39th/e pg 1255)

- ◆ The liver is one of the most precocious embryonic organs and is the main centre for hemopoiesis in the fetus
- ◆ It develops from an endodermal evagination of the foregut and from the proliferating coelomic epithelium in the protocardiac region
- ◆ The development of the liver is intimately related to the development of heart.
- ◆ The triangular region of absorption of the mesonephric duct contributes to the trigone of bladder and dorsal wall of the proximal half of the prostatic urethra i.e. as far as the opening of the prostatic utricle and ejaculatory ducts, or its female homologue, the whole female urethral dorsal wall - (Pg 1378 - Gray's Anatomy)

◆ Pg 208

Coelomic wall epithelium derivatives :-

- Pronephros
- Epithelial lining of uterine tubes
- Epithelial lining of mesonephric ducts
- Ureters
- Vesical trigone

318. (d) Ureteric bud

(Ref : Gray's Anatomy 39th/e pg 1377)

Pg 1375 - The metanephric kidney develops from three sources

- (1) An evagination of the mesonephric duct - the ureteric bud
- (2) A local condensation of mesenchyme - the metanephric blastema
- (3) Angiogenic mesenchyme migrates into the metanephric blastema slightly later to produce the glomeruli and vasa recta

Pg 1377 -

Subsequent divisions of the ureteric bud and associated mesenchyme define the gross structure of the kidney and the major and minor calyces, the distal branches of the ureteric ducts that will form the collecting ducts of the kidney

319. (d) Stapes

(Ref : Gray's Anatomy 39th/e pg 450)

Second pharyngeal arch :-

"The cartilaginous element of the second arch (Reichert's cartilage) extends from the otic capsule to the mid-line on each side

- ◆ It's dorsal end separates and becomes enclosed in the developing tympanic cavity as the stapes
- ◆ The cartilage also gives rise to the
 - styloid process
 - stylohyoid ligament
 - lesser cornua and cranial rim of the body of hyoid bone

The remainder of the hyoid bone derives from the third arch

320. None

(Ref : Gray's Anatomy 39th/e pg 187, 189, 1324)

Pg 187 In cleavage the generation of cell diversity, to either trophectoderm or inner cell mass, occurs in the 16-cell morula and precedes the formation of blastocyst

Pg 189 On the sixth post-ovulatory day the blastocyst adheres to the uterine mucosa and the events leading to the specialized, intimate contact of trophoblast and endometrium commence.

Implantation, which is the term used for this complicated process, includes the following stages :

- (1) Dissolution of zona pellucida
- (2) Orientation and adhesion of the blastocyst onto the endometrium
- (3) Spread and proliferation of the trophoblast, which envelops and specifically disrupts & invades the maternal tissues

Pg 1324 Primary follicle :-

The oocyte increases in size and secretes a thick layer of extracellular proteoglycan - rich material, the zona pellucida, between its plasma membrane and the surrounding granulosa cells of the early follicle

321. (a) Embryonic disc

(Ref : Gray's Anatomy, 39th/e pg 189, 193)

♦ The free unattached blastocyst is assigned to stage 3 of development at approximately 4 day post-ovulation, whereas implantation (before villus development) occurs within a period of 7-12 days post - ovulation.

♦ Even at this early stage, cells of the inner cell mass are already arranged into an upper layer (i.e. closest to the polar trophoblast), the epiblast, which will give rise to the embryonic cells, and a lower layer, the hypoblast, which has an extra - embryonic fate

♦ Thus the dorsoventral axis of the developing embryo and a bilaminar arrangement of the inner cell mass (Bilaminar embryonic disc) is established at (or) before implantation

(The earliest primordial germ cells may also be defined at this stage)

322. (c) 3rd pouch

(Ref : Gray's Anatomy 39th/e pg 617)

Thymus :-

- ◆ The thymus gland is formed from the ventral part of the 3rd pharyngeal pouch on each side
- ◆ It cannot be recognised prior to the differentiation of the inferior parathyroid glands at stage 16, but thereafter it is represented by two elongated diverticula which soon become solid cellular masses and grow caudally into the surrounding cardiac (vagal) neural crest mesenchyme.
- ◆ The connection with the 3rd pouch is soon lost but the stalk may persist for some time as a solid, cellular cord
- ◆ Defective development of cardiac neural crest which affects the heart and peripheral neural ganglia also results in thymic deficiencies as seen in **Digeorge and Pierre Robin syndromes.**

323. (c) Paraxial mesoderm

(Ref : Gray's Anatomy 39th/e pg 201)

Mesenchyme - Pg 201

(The term mesoblast and mesenchyme are used in this text in a specific manner and not interchangeably)

Previously, cells forming a population between the epiblast and hypoblast were termed mesoderm and, more recently, mesenchyme

Mesenchyme**Primary**

Arise from ingression through the primitive streak

Secondary

Arise from Neural crest ingression

Pg 202 :-

Whereas some primary mesenchymal cells may become epithelial within a short time frame

eg : somites and lateral plate

other cells may transform later

eg : the epithelium lining the blood vessels

To cope with these conflicts in terminology, the mixed population of epiblast cells that ingress through the primitive streak and come to lie between the epiblast and embryonic endoderm is termed mesoblast until they have migrated to their final position, at which time the populations of mesenchyme can be identified and their fates inferred.

Paraxial mesenchyme - Pg 209

The paraxial mesenchyme extends cranially from the primitive streak to the prechordal plate immediately rostral to the notochord

Before somite formation it is also termed pre-somitic (or) unsegmented mesenchyme.

324. (a) Ligamentum teres

(Ref : Gray's A 39th/e pg 1047)

- ◆ At approximately 7mm crown-rump length, the right umbilical vein retrogresses completely
- ◆ The left umbilical vein retains some vessels discharging directly into the sinusoids, but new enlarging connections with the left half of the subhepatic intervitteline anastomosis emerge
- ◆ The latter is the start of a bypass channel for the majority of the placental blood, which continues through the median ductus venosus and finally the right half of the subdiaphragmatic anastomosis, to reach the termination of the inferior vena cava.
- ◆ Postnatally, these channels are obliterated with the resulting ligamentum teres extending from the umbilicus to the porta hepatis, whence having established connections with the left branch of the portal vein, it continues as the ligamentum venosum to join an upper left hepatic vein, and terminates in the suprahepatic inferior vena cava.

325. (b) Metanephric duct

(Ref : Gray's Anatomy 39th/e pg 1375)

The metanephric nephrons (ducts) do not join with the existing mesonephric duct, (which is just a linear structure containing stacks of tubules distributed along the craniocaudal axis of embryo, resulting in production of hypotonic urine), they join with an evagination of that duct (ureteric ducts) which branches dichotomously to produce a characteristic pattern of collecting ducts.

Pg 1376 & 1377 - The ureteric bud undergoes a series of bifurcations within the surrounding metanephric mesenchyme, and forms smaller ureteric ducts.

- ◆ At the same time the metanephric mesenchyme condenses around the dividing ducts to form S-shaped clusters, which transform into epithelia and fuse with the ureteric ducts at their distal ends, while expanding as a dilated sac at its own proximal end.

The cells differentiate locally such that the outer cells become the parietal glomerular cells, while the inner ones become visceral epithelial podocytes.

Thus it is clear that the proximal convoluted tubules develop from the metanephric duct along with the glomerular (visceral and parietal) epithelia.

Angiogenic mesenchyme → endothelial and mesangial cells within the glomeruli

Mesonephric duct → ureteric bud → Ureteric ducts → Collecting ducts

Metanephric duct → glomeruli and all tubules till collecting ducts

326. (b) Right subclavian artery

(Ref : Gray's Anatomy 39th/e pg 1042)

The fourth aortic arch on the right forms the proximal part of the right subclavian artery, whereas the corresponding on the left constitutes the arch of the definitive aorta between the origins of the left common carotid and left subclavian arteries.

(It has proved difficult to assess accurately the contributions of the fourth embryonic aortic arches. It has also been claimed that the left fourth aortic arch is subsequently drawn into the descending (or) ascending, or both, limbs of the definitive aortic arch, and the corresponding vessel on the right contributes to the brachiocephalic artery)

327. (d) Follicular cells

(Ref : Gray's Anatomy 39th/e 1324, 1325)

Primary follicle : (Pg 1324)

The first sign of activation is a change in the follicle cells from flattened to cuboidal.

This is followed by their proliferation to give rise to multilayered follicle consisting of granulosa cells surrounded by a thick basal lamina.

Pg 1325 :-

- ◆ The oocyte at ovulation is still surrounded by its zona pellucida and corona radiata of granulosa cells

328. (b) Odontoblast

(Ref : Gray's Anatomy 39th/e pg 613)

- ◆ Teeth form from a series of epithelial / mesenchymal interactions along the dental lamina. In 27mm embryos individual dental laminae expand into ectodermal (dental) sacs surrounded by vascular mesenchyme.
- ◆ The ectoderm proliferates to form an enamel organ which surrounds a local portion of first arch neural crest mesenchyme, the dental papillae, collectively this unit is constitutes a tooth bud (or) germ
- ◆ The inner layer is tightly adherent to the dental papilla and separated from the outer layer by accumulated glycosaminoglycans
- ◆ The inner cells of the enamel organ differentiate into ameloblasts and the underlying mesenchymal cells into odontoblasts

329. (a) 3rd month of i.u. life

(Ref : Gray's Anatomy 39th/e pg 171)

Melanocytes of neural crest origin, are present in the bilaminar epidermis of cephalic regions as early as 8 weeks (2 months)

By 12-14 weeks they can reach a density of 2300 per mm² reducing to 800 per mm² just before birth

330. (a) Two medial nasal processes

(Ref: Gray's Anatomy 39th/e pg 609)

"The elevations formed around the pits (olfactory) during the stages 14 and 15 are termed medial and lateral nasal processes

- ◆ By stage 16 the medial processes have moved closer together and project caudally beyond the lateral processes
- ◆ Internally the medial processes project into the roof of the stomatodeum to form the pre-maxillary fields.
- ◆ The frontonasal process gives rise to forehead nose, philtrum of the upper lip, premaxilla and upper incisor teeth".

Also see fig 34.1 - If the two medial nasal processes fail to fuse then there will be a median defect in the upper lip in the region of philtrum.

Pg 617 - "Midline anomalies such as median cleft lip (true hare lip), cleft nose and cleft lower jaw are rarely encountered".

331. (a) 3rd week

(Ref: Gray's Anatomy 39th/e pg 192 Fig 10.12)

In this figure description of stages is done against day, which is as follows :-

Days	Description of stage
1	stage 1 → Fertilization First cleavage
2-3	stage 2 → Preimplantation Compaction
4	stage 3 → Free blastocyst hatched from zona
5-6	stage 4 → Implantation
7-8	stage 5a →
9-10	stage 5b → } Implanted previllous
11-12	stage 5c →
13-14	stage 6a → Secondary yolk sac
14-15	stage 6b → Primitive streak
16 (3 rd week)	stage 7 → Notochord
17-18	stage 8 → Neureneric canal Before folding
19-20	stage 9 → Neural groove somites, Intra embryonic coelom
21-23	stage 10 → Neural tube After folding Neural crest

332. (c) Abdominal wall

(Ref: Gray's 39th/e pg 1257 - 1258)

- ◆ Exomphalos is a ventral wall defect with midline herniation of the intra-abdominal contents into the base of the umbilical cord
- ◆ Herniated viscera are covered by the peritoneum internally and amnion externally

- ◆ The omphalocele so formed ranges in size from a large umbilical hernia to a very large mass containing most of the visceral organs
- ◆ Even after the exomphalos has been repaired these babies will still have a deficient anterior abdominal wall

333. (b) Process by which 3 germinal layers form

(Ref : *Gray's Anatomy 39th/e pg 193*)

- ◆ At early stage 6, the epiblast is producing extraembryonic mesenchyme from its caudal margin
- ◆ With the appearance of the primitive streak, a process is begun whereby cells of the epiblast either pass deep to epiblast layer to form the populations of cells within the embryo, (or) remain on the dorsal aspect of the embryo to become the embryonic ectoderm
- ◆ The primitive streak marks the beginning of gastrulation, (14th day) a period when gross alterations in morphology and complex rearrangements of cell populations occur
- ◆ During this time, the epiblast will give rise to a complex multilaminar structure with a defined craniocaudal axis
- ◆ By the end of gastrulation, cell populations from different, often widely separated, regions of the embryonic disc will become closely related and the embryonic shape will have been produced.
- ◆ Epiblast and hypoblast contain mixed populations of cell with little restriction, which establish the placental structures and extra embryonic tissues before the production of embryonic cell lines at gastrulation

334. (a) RA & LV

(Ref : *Gray's Anatomy 39th/e pg 1001*)

- ◆ "Anterosuperior to the insertion of the tendon of Todaro, the septal wall is formed by the atrioventricular component of the membranous septum, intervening between the right atrium and sub-aortic outlet of the left ventricle".

335. (c) Optical vesicle appears

(Ref : *Gray's Anatomy 39th/e pg 721*)

"During the period when the rostral neuropore closes, at about 24 days, the walls of the forebrain at the optic sulcus begin to evaginate, projecting laterally towards the surface ectoderm so that, by 25 days, the optic vesicles are formed"

336. (b) Conus septum

(d) Endocardial cushion

(e) Bulbar septum

(Ref : *Gray's Anatomy 39th/e pg 1034*)

SEPTATION OF VENTRICLES :-

" It involves a series of complex changes in which three distinct factors contribute to the formation of the adult ventricular septum. These are the muscular ventricular septum, the proximal bulbar septum (continuous with the aorticopulmonary spiral septum) and the atrioventricular endocardial cushions".

337. (b) Prophase 1st meiotic

(Ref : Gray's Anatomy 39th/e pg 1386)

Ovary - Under development of urogenital system :-

"The medulla subsequently regresses, and connective tissue and blood vessels from this region invade the cortex to form ovarian stroma. During this invasion the clusters of epithelial cortical cells break into individual groups of supporting cells (now identified as granulosa cells), which surround the primordial germ cells (now identified as primary oocytes) that have entered the prophase of the 1st meiotic division"

Pg 1391 - All of the primary oocytes for the reproductive life of a female are present in her ovaries by the end of 1st trimester of pregnancy. Of the 7,000,000 primary oocytes estimated to be present at the 5th month of gestation, 1,000,000 remain at birth, 40,000 by puberty, and only 400 are ovulated during reproductive life.

338. (c) Spermatids

339. (b) Seminiferous tubules

(Ref : Gray's Anatomy 39th/e pg 1308)

- ◆ These are 400 - 600 seminiferous tubules in each testis
- ◆ The length of each is 70-80 cm
- ◆ Diameter - 0.12 - 0.3 mm
- ◆ Each tubule is surrounded by a basal lamina, on which rests a complex, stratified seminiferous epithelium containing spermatogenic cells and supportive sertoli cells
- ◆ When active, the spermatogenic cells include basally situated spermatogonia and their progeny in the adluminal compartment, spermatocytes, spermatids and mature spermatozoa

◆ Spermatogonia :-

- The stem cells for all spermatozoa
- There are three basic groups of spermatogonia
 - (1) Dark type A (Ad)
 - (2) Pale type A (Ap)
 - (3) Type B
- Ad - divides (Mitotically) - less before puberty - but ↑ses with androgenic stimulation
- Some divisions result in → AP cells

- AP cells - also divide mitotically but remain linked via cytoplasmic bridges
- These are the precursors of type B cells which are committed to the spermatogenic sequence
- Type B - leave the basal compartment & cross the blood testis barrier to enter meiotic prophase as primary spermatocytes.
- ◆ Primary spermatocytes :-
- Diploid chromosome number but duplicated sister chromatids (DNA content is thus $4N$ where N is DNA content of haploid spermatozoa)
- They are all at some stage of a long meiotic prophase of 3 weeks
- Different stages in the process of crossing over and genetic exchange between chromatids of maternal and paternal homologues

Secondary Spermatocytes :-

- ◆ The primary spermatocytes give rise to secondary spermatocytes with a haploid chromosome complement (but $2N$ DNA content), the reduction division is designated as meiosis I.
- ◆ Few of them are seen in tissue sections because they rapidly undergo the second meiotic division (equatorial) division, where sister chromatids separate (DNA content now N) to form haploid spermatids

Theoretically each primary spermatocyte



4 spermatids

But some degenerated during maturation so that yield is low.

Spermatids :- Do not divide further but they undergo the process of spermiogenesis that results in formation of spermatozoa.

340. (b) 24 days

(Ref : Gray's Anatomy, 39th/e pg 241)

- ◆ The regions of rostral and caudal fusion (of neural tube) are termed rostral and caudal neuropore
- ◆ Primary neurulation ceases when the neural tube has closed completely: the rostral neuropore closes during stage 11 (24 days) and the caudal neuropore during stage 12.

341. (d) Bone marrow

(Ref : Gray's Anatomy 39th/e pg 208, 78)

Pg 78 - Marrow consists of vascular and extravascular compartments, both enclosed with a bony framework from which they are separated by a thin layer of endosteal cells. (which means)

Pg 77 - The red bone marrow consists of a network of loose connective tissue, the stroma, which supports

clusters of haemopoietic cells (hemopoietic cords (or) islands) and a rich vascular supply in which large, thin-walled sinusoids are the main feature

The vascular supply → from nutrient artery to bone

Drainage → via disproportionately large veins

Lymphatics are absent from bone marrow

So bone marrow has :-

Pg 78 - (1)The stroma → Embryonic mesenchyme

(type III collagen)

&

fibroblasts

(2)The blood vessels → Angiogenic mesenchyme - endothelium

Lateral plate mesenchyme - smooth muscle and connective tissue of blood vessels

(3)Hematopoietic cells → Angiogenic mesenchyme - Circulating blood cells

For other options :- Pg 208

(1)Cerebellum → Neural plate epithelium

(2)Anal canal → Surface ectoderm epithelium

(3)Sebaceous gland → Surface ectoderm epithelium
(Epidermal structures)

342. (a) Genital tubercle

(Ref : Gray's Anatomy, 39th/e pg 1394)

Table 109.1 Homologous of the parts of the urogenital system in male and female

(1) Gonad	Testis	Ovary
(2) Gubernacular cord	Gubernaculum testis	Ovarian & round ligament
(3) Mesonephros (Wolffian body)	Appendix of epididymis (?) Efferent ductules Lobules of epididymis Paradidymis. Aberrant ductules	Appendices vesiculosae (?) Epoophoron Paraoophoron
(4) Mesonephric duct (Wolffian duct)	Duct of epididymis Vas deferens Ejaculatory duct Part of bladder & prostatic urethra	Duct of epoophoron (Gartner's duct) Part of bladder and urethra

(5) Paramesonephric (or mullerian duct)	Appendix of testes Prostate utricle	Uterine tube, uterus Vagina (?)
(6) Allantois duct	Urachus	Urachus
(7) Cloaca : Dorsal part	Rectum and upper part of anal canal	Rectum & upper part of anal canal
Ventral part	Most of bladder Part of prostatic urethra	Most of bladder & the urethra
Urogenital sinus	Prostatic urethra distal to utricle Bulbo - urethral glands Rest of urethra to glans	Greater vestibular glands, Vestibule
(8) Genital folds	Ventral penis	Labia majora
(9) Genital tubercle	Glands penis, urethra in glans	Clitoris

343. (d) Coloboma of iris

(Ref : Gray's Anatomy, 39th/e pg 721)

The antero ventral surface of the vesicle (optic) and the distal part of the stalk are also infolded forming a wide groove - the choroid fissure - through which mesenchyme extends with an associated artery, the hyaloid artery.

As growth proceeds, the fissure closes, and the artery is included in the distal part of the stalk.

Failure of the optic fissure to close is a rare anomaly that is always accompanied by a corresponding deficiency in the choroid and iris (congenital coloboma)

For option (a)

- ◆ The lateral part of the optic vesicle also invaginates to form a cup, the inner layer of which - facing the lens vesicle - will become the sensory retina and the outer layer becomes the pigmented retinal epithelium.
- ◆ The pigmented layer becomes attached to the mesenchymal sheath, but the junction between the pigmented and sensory layers is less firm and is the site of pathological detachment of the retina
- ◆ Iridodonesis is 'trembling iris' (Parson's Disease of the Eye - 19th/e pg 397)
- ◆ Retinoblastoma is a tumor confined to infants and very young children is frequently congenital, although it may remain quiescent or pass unnoticed until the fifth or sixth year of life & sometimes even later
 - Is a proliferation of neural cells which have failed to evolve normally
 - Retinoblastoma was the first cancer to be directly associated with a genetic abnormality deletions or mutation of the q14 band of chromosome 13.

Upper limb

Questions

- 344.** Which of the following nerves are branches of the posterior cord (PGI 84)
- a. Radial nerve
 - b. Axillary nerve
 - c. Musculocutaneous nerve
 - d. Subclavius nerve
 - e. Lateral pectoral nerve
- 345.** Root value of ulnar nerve (JIPMER 86, KERALA 87)
- a. C7 C8T1
 - b. (C7) C8 T1
 - c. C8 T1
 - d. C6 C7 C8
 - e. C5 C6 C7
- 346.** Medial cord of the brachial plexus gives rise to all except- (PGI 88)
- a. Nerve to supraspinatus
 - b. Ulnar nerve
 - c. Medial cutaneous nerve of the arm
 - d. Medial cutaneous nerve of forearm
- 347.** Root value of musculocutaneous nerve is- (UPSC 89)
- a. C4,5
 - b. C5,6,7
 - c. C5,6,7,8
 - d. C8 T1
- 348.** Musculocutaneous nerve supplies: (PGI 86, UPSC 86)
- a. Brachialis
 - b. Biceps brachii
 - c. Coracobrachialis
 - d. All of the above
- 349.** The term eye of the hand applies to which nerve (UPSC 89)
- a. Median
 - b. Ulnar
 - c. Radial
 - d. Axillary

350. Ulnar nerve supplies all except: (AI 91)

- a. 3rd and 4th lumbrical muscles
- b. Palmar and dorsal interosseous muscles
- c. Adductor pollicis
- d. Flexor pollicis brevis

351. Ulnar nerve supplies all of the following except (JIPMER 92)

- a. Flexor digitorum profundus
- b. Dorsal interosseous
- c. Abductor pollicis brevis
- d. Extensor carpi ulnaris

352. Injury to radial nerve at wrist leads to; (DELHI 93)

- a. Wrist drop
- b. Sensory loss on adjacent sides of the 3rd and 4th fingers
- c. Paralysis of adductor pollicis
- d. Loss of supination in extended position

353. When median nerve is paralyzed in carpal tunnel syndrome which of the following occurs (JIPMER 95)

- a. Adductor pollicis paralysis
- b. Flexor pollicis longus paralysis
- c. Flexor pollicis brevis paralysis
- d. Loss of sensation of thenar eminence

354. Injury to ulnar nerve at wrist causes paralysis of- (AI 95)

- a. Apposition of thumb
- b. Abduction of carpometacarpal joint of thumb
- c. Adduction at thumb
- d. Flexion of metacarpophalangeal joint of middle finger

355. All of the following are sequelae of musculocutaneous nerve injury except: (AI 96)

- a. Loss of supination of forearm
- b. Loss of flexion of arm
- c. Loss of flexion at elbow
- d. Sensory loss over lower lateral area of forearm

356. Nerve damage affecting movements of thumb-(TN 97)

- a. Median nerve
- b. Ulnar nerve
- c. Radial nerve
- d. Posterior interosseous nerve

357. C8 T1 supplies all muscles except- (AIIMS 98)

- a. Extensor indices
- b. 3rd and 4th lumbricals
- c. Abductor digiti minimi
- d. Palmar interosseous

358. Nail bed of thumb is supplied by-(ORISSA 98)

- a. Radial nerve
- b. Ulnar nerve
- c. Median nerve
- d. None of the above

359. Metacarpophalangeal joints are flexed in the paralysis of-(AI 99)

- a. Median nerve
- b. Radial nerve
- c. Ulnar nerve
- d. Axillary nerve

360. Intercostobrachial nerve is a branch of (JIPMER 2002)

- a. 1st intercostal nerve
- b. 2nd intercostal nerve
- c. 3rd intercostal nerve
- d. Upper trunk of brachial plexus

361. Ulnar nerve injury at wrist spares which muscles (PGI 97)

- a. Opponens pollicis
- b. Palmar interossei
- c. Dorsal interossei
- d. Adductor pollicis

362. Muscles attached to the hook of hamate are/is: (PGI 97)

- a. Flexor carpi ulnaris
- b. Flexor retinaculum
- c. Flexor hallucis longus
- d. Flexor digitorum longus

363. Nerve damaged due to lunate dislocation (in carpal tunnel)- (PGI 2000)

- a. Median & ulnar
- b. Median
- c. Ulnar
- d. Radial

364. Median nerve injury at elbow affects (PGI 02)

- a. Adduction of the thumb
- b. Flexion at DIP joints of 2nd finger
- c. Flexion of PIP joints of 3rd finger
- d. Flexion at DIP of 1st and 2nd fingers
- e. Flexion at MCP joints except thumb

365. The glenoid cavity of the scapula is rotated upwards by which of the following muscles (PGI 84)

- a. Levator scapulae
- b. Serratus anterior
- c. Rhomboid minor
- d. Trapezius

366. A patient is found to have pus in the midpalmar space. The space is- (PGI 86)

- a. The space around the hypothenar muscles
- b. The synovial sheath for the flexor pollicis longus tendon
- c. The ulnar tendon
- d. The space around the muscles of the thenar eminence
- e. A space lying medial to the fibrous septum attaching the palmar aponeurosis to the third metacarpal bone

367. Which tendon is frequently absent in the hand (UPSC 86, JIPMER 86, PGI 87)

- a. Palmaris longus
- b. Extensor carpi radialis longus
- c. Extensor carpi radialis brevis
- d. Flexor carpi ulnaris
- e. Flexor digitorum profundus

368. Flexors of the elbow are: (PGI 88)

- a. Brachialis
- b. Biceps
- c. Brachioradialis
- d. Coracobrachialis

369. In the region of the shoulder- (AP 88)

- a. The glenohumeral joint permits 180 degree of abduction
- b. The glenohumeral joint is reinforced on all aspects (superiorly, inferiorly, anteriorly and posteriorly) by muscles of the rotator (musculotendinous) cuff.
- c. The subacromial bursa is inferior to the supraspinatus tendon and muscle
- d. The glenohumeral joint permits flexion, extension, abduction, adduction, and both internal and external rotation

250 Anatomy

- 370.** Regarding serratus anterior muscle which is incorrect- (AI 89)
- a. Multipinnate muscle
 - b. Lifts arm above the shoulder
 - c. Supplied by long thoracic nerve
 - d. Originates from lower eight ribs
- 371.** Ossification center of the medial epicondyle appears in- (ROHTAK 90)
- a. 5th year
 - b. 7th year
 - c. 9th year
 - d. 11th year
- 372.** Muscles that extend the middle distal phalanx or the index finger include all except: (AMU 91)
- a. The first dorsal interosseous
 - b. The first lumbrical
 - c. The second palmar interosseous
 - d. Extensor carpi radialis longus
- 373.** The prime flexor of the metacarpophalangeal joint: (AI 91)
- a. Lumbrical muscles
 - b. Flexor digitorum superficialis
 - c. Flexor digitorum profundus
 - d. Dorsal interosseous muscles
- 374.** Nerve not related to humerus is: (KERALA 91)
- a. Radial
 - b. Median
 - c. Axillary
 - d. Musculocutaneous
- 375.** Structures piercing the clavipectoral fascia are: (KERALA 91)
- a. Basilic vein
 - b. Cephalic vein
 - c. Thoracoacromial artery
 - d. Musculophrenic nerve
- 376.** Which is correct regarding deep palmar arch: (AIIMS 91)
- a. Superficial to lumbricals
 - b. Lies at level of distal palmar crease
 - c. Formed by deep branch of ulnar artery
 - d. Gives three interdigital arteries

377. The following structures form the boundaries to the superior entrance into the axilla except the-(PGI 92)
- Clavicle
 - Coracoid process
 - Upper border of scapula
 - Outer border of first rib
378. Axial artery of the upper limb is derived from: (JIPMER)
- 4th cervical intersegmental
 - 5th cervical intersegmental
 - 6th cervical intersegmental
 - 7th cervical intersegmental
379. Which of the following nerves does not take part in scapular anastomosis: (TN 95)
- Subscapular artery
 - Suprascapular artery
 - Transverse cervical artery
 - Anterior circumflex humeral artery
380. Blood supply of breast is from all except (AIIMS 99)
- Internal mammary artery
 - Intercostal artery
 - Thoracodorsal artery of the subscapular artery
 - Thoraco-acromial artery
381. All are sensory except (MP 2K)
- Saphenous nerve
 - Sural nerve
 - Intercostobrachial nerve
 - Long thoracic nerve
382. In fracture avulsion of greater tubercle of humerus which movement will be affected (AIIMS 2K)
- Abduction and external rotation
 - Flexion and external rotation
 - Flexion and abduction
 - Adduction and internal rotation
383. Adduction of hand at wrist is done by: (PGI 2000)
- Flexor carpi radialis
 - Flexor carpi longus
 - Flexor digitorum profundus
 - Extensor carpi ulnaris
 - Flexor digitorum superficialis

384. Erb's point is : (PGI 03)

- a. C5 C6
- b. C7 C8
- c. Long thoracic nerve
- d. Thoracodorsal nerve
- e. Superior thoracic nerve

385. Thenar eminence is supplied by:- (PGI 03)

- a. Median nerve
- b. Radial nerve
- c. Ant. Interosseous nerve
- d. Post. Interosseous nerve
- e. Ulnar nerve

386. III head of coracobrachialis is known as:- (Jipmer 04)

- a. Struthers ligament
- b. Brachioradialis
- c. Radial collateral ligament
- d. Ulnar ligament

387. Which of the following is not attached to pisiform bone- (Bihar 03)

- a. Flexor retinaculum
- b. Abductor digiti minimi
- c. Flexor digitorum superficialis
- d. Flexor carpi ulnaris

388. The pronator quadratus has the same innervation as the following muscle- (AIIMS 03)

- a. Flexor digitorum superficialis
- b. Palmaris longus
- c. Flexor pollicis longus
- d. Flexor digitorum profundus of middle finger

389. Rupture of supraspinatus manifests as- (PGI 96)

- a. Painful movements
- b. Difficulty in initiation of abduction
- c. Difficult abduction after 90 degrees
- d. Flat shoulder

390. Following groups of axillary L.N. are distributed along lateral thoracic artery-(C.U.P.G.E.E 99)
- a. Anterior set
 - b. Lateral set
 - c. Posterior set
 - d. Apical set
391. Lower angle of scapula is at the level of- (DNB 2001)
- a. T4
 - b. T5
 - c. T6
 - d. T7
392. Fracture of the surgical neck of humerus results in- (AI 89)
- a. Loss of sensation in dorsal forearm
 - b. Flat shoulder
 - c. Wrist drop
 - d. Claw hand
393. Which structure does not pass through the carpal tunnel- (PGI 86, AI 88)
- a. Median nerve
 - b. Radial bursa
 - c. Ulnar bursa
 - d. Ulnar nerve

Upper limb

Answers

- 344. Answer (a) , (b); Radial nerve and Axillary nerve
(B.D.C Vol. I, 4th Ed/ Pg.52)**

Branches of the posterior cord of Brachial Plexus are:

- | | |
|------------------------------|-----------|
| 1. Upper Subscapular nerve | C5 C6 |
| 2. Nerve to Latissimus Dorsi | C6 C7 C8 |
| 3. Lower Scapular | C5 C6 |
| 4. Axillary nerve | C5 C6 |
| 5. Radial Nerve | C5-C8, T1 |

- 345. Answer (b)
(B.D.C Vol. I, 4th Ed/ Pg.52, Gray's anatomy Pg.805 and Pg.806 Fig.48.7)**

The C7 fibres reach the Ulnar nerve by a communicating branch from the lateral root of Median nerve.

- 346. Answer (a) Nerve to Supraspinatus
(B.D.C Vol. I, 4th Ed/ Pg.52)**

Branches of the medial Cord of Brachial plexus are:

1. Medial Pectoral C8 T1
2. Medial cutaneous nerve of arm C8 T1
3. Medial cutaneous nerve of forearm C8 T1
4. Ulnar nerve C7 C8 T1
5. Medial root of Median nerve C8 T1

- 347. Answer (b) C5 C6 C7
(B.D.C Vol. I, 4th Ed/ Pg.52)**

Branches of lateral cord of Brachial Plexus are:

1. Lateral Pectoral Nerve C5-C7
2. Musculocutaneous Nerve C5-C7
3. Lateral root of Median nerve C5-C7

- 348. Answer (d) All of the above
(B.D.C Vol. I, 4th Ed/ Pg.88)**

Muscular branches of musculocutaneous nerve(C5-C7):

1. Coracobrachialis
2. Biceps-long and short head
3. Brachialis

349. Answer (a) Median Nerve(B.D.C Vol. I, 4th Ed/ Pg.125)**In the hand, the Median Nerve supplies:****5 muscles:**

1. Abductor pollicis brevis
2. Flexor pollicis brevis
3. Opponens pollicis
4. 1st lumbrical
5. 2nd lumbrical

Palmar skin over the lateral 3 ½ digits with their nail beds

Median nerve injuries are more disabling than ulnar nerve lesions, largely due to inability to oppose the thumb, so that gripping action of the hand is totally lost.

The median nerve controls coarse movements of the hand as it supplies most of long muscles of the front of the forearm. Hence also called the 'Labourer's nerve'

350. Answer is suggestive of (d) Flexor pollicis brevis(B.D.C Vol. I, 4th Ed/ Pg.124)**Branches of the Ulnar Nerve in hand are:****Superficial Branch and Deep branch:****Superficial Branch has:**

Muscular branch for Palmaris brevis

Cutaneous branch supplying skin over the medial 1 ½ digits with their Nail beds.

Deep Branch has:

Muscular branch supplying:

Three muscles of hypothenar eminence: Abductor digiti minimi,**Flexor digiti minimi, Opponens digiti minimi****Medial 2 lumbricals****8 interossei****Adductor pollicis (transverse head)****Occasionally the deep head of flexor pollicis brevis.****351. Answer (c) and (d)**(B.D.C Vol. I, 4th Ed/ Pg.123 and 125)

- Medial half of flexor digitorum profundus is supplied by Ulnar nerve and lateral half is supplied by Median nerve.
- The 8 interossei are supplied by ulnar nerve i.e. Dorsal and palmar.
- Abductor pollicis brevis – Median Nerve.
- Extensor carpi ulnaris- Radial nerve through Posterior interosseous nerve (PIN).

352. Answer None

(B.D.C Vol. I, 4th Ed/ Pg. 171-172 for a and d, Pg.66 for b, pg.117 for c)

- **Paralysis of extensor muscles of forearm** → Wrist drop (due to radial nerve lesion above the level of origin of PIN eg. In Axilla & arm)
- The superficial branch of Ulnar nerve → the adjoining sides of ring and little fingers.
- **Adductor pollicis** is supplied by → Ulnar nerve.
- **Supination of forearm** is an action performed by the supinator muscle supplied by → PIN (C6, C7) a branch of Radial nerve.

Radial nerve lesion:

In radial sulcus → Weakness of elbow extension with wrist drop.
At level of Lateral epicondyle → Extension of elbow is normal but there is Wrist drop.

353. Answer (c) Flexor pollicis brevis paralysis

(B.D.C Vol. I, 4th Ed/Pg. 113,117,104, Gray's anatomy 39th Ed/Pg.932)

- The concavity of the carpal bones anteriorly is converted into a tunnel by the flexor retinaculum.
- Carpal tunnel syndrome is the most common entrapment mononeuropathy.
- Median nerve is compressed under the flexor retinaculum due to:
 - Rheumatoid arthritis
 - Myxedema
 - Acromegaly
 - Edema and obesity
 - Pregnancy
- The palmar branch of median nerve is spared as it passes superficial to the flexor retinaculum, and supplies the skin over the thenar eminence.
- Adductor pollicis brevis is supplied by ----→ ulnar nerve (deep branch) Pg.117.
- Flexor pollicis longus is supplied by ----→ AIN (anterior interosseous nerve) branch of median nerve. Pg.104.

354. Answer (c) Adduction of thumb

(B.D.C Vol. I, 4th Ed/ Pg.117, 133-134)

- o Adductor pollicis brevis----→ deep branch of ulnar nerve.
- o Abduction of thumb at the metacarpophalangeal jt. And carpometacarpal jt. is brought about by----→ Adductor pollicis brevis----→ Median nerve.
- o Abduction and extension at carpometacarpal jt.----→ Adductor pollicis longus----→ PIN (C7 C8) branch of radial nerve.

355. Answer (a)(B.D.C Vol. I, 4th Ed/ Pg.85 table 8.2)**Musculocutaneous nerve supplies:**

- o **Coracobrachialis**-----→flexes the elbow at elbow jt.
- o **Biceps brachii**-----→strong supinator when forearm is flexed.
- o **Flexes forearm at elbow**
- o **Short head flexes arm**
- o **Brachialis**-----→flexes forearm at elbow.

356. Answer (all), though median nerve injury is more disabling(B.D.C Vol. I, 4th Ed/ Pg.116)

<u>Sr.no</u>	<u>Movements of thumb</u>	<u>Muscles</u>	<u>Nerve supply</u>
1.	Abduction	Abductor pollicis brevis	Median nerve
2.	Adduction	Adductor pollicis	Deep branch of ulnar nerve
3.	Flexion	Flexor pollicis brevis(FPB) and longus (FPL)	(FPB)>Median N (FPL)>AIN
4.	Extension	Extensor pollicis longus (Extension at all joints of thumb)	PN
5.	Opposition	Extensor pollicis brevis Opponens pollicis	PN Median nerve

357. Answer (a) Extensor Indicis(B.D.C Vol. I, 4th Ed/ Pg. 53,135)

- o **Extensor indicis** -----→Posterior interosseous nerve (PIN)
C7,C8. (Pg.135)
- o **Intrinsic muscles of hand**-----→T1. (Pg.53)
- o **Ulnar flexors of wrists & fingers**-----→C8. (Pg.53)
- o **3rd and 4th lumbricals**-----→ulnar nerve C8, T1.(Pg.118)
- o **Abductor digiti minimi**-----→Deep branch of ulnar nerve C8,T1. (Pg.117)

358. Answer (c) Median nerve(B.D.C Vol. I, 4th Ed/ Pg.125)**Median nerve in the hand supplies:**

- o **Abductor pollicis brevis**
- o **Flexor pollicis brevis**
- o **Opponens pollicis**
- o **1st and 2nd lumbricals**

And Palmar skin over the lateral 3 ½ digits with their nail beds.

359. Answer (b) Radial nerve(B.D.C Vol. I, 4th Ed/ Pg.171,132)

The radial nerve supplies the majority of muscles of the extensor compartment , and also extensor digitorum which causes

extension of Interphalangeal, metacarpophalangeal and wrist jts, which is paralysed and hence metacarpophalangeal jts are flexed as in wrist drop.

360. Answer (b) 2nd Intercostobrachial nerve

(B.D.C Vol. I, 4th Ed/ Pg.208)

The lateral cutaneous branch of the second intercostals nerve is known as the Intercostobrachial nerve.

361. Answer (a) Opponens pollicis

(B.D.C Vol. I, 4th Ed/ Pg. 124)

Ulnar nerve in the hand supplies:

- o Palmaris brevis
- o Abductor digiti minimi
- o Flexor digiti minimi
- o Opponens digiti minimi
- o Medial two lumbricals
- o 8 interossei
- o Adductor pollicis

Opponens pollicis is a muscle of thenar eminence and is supplied by Median nerve.

362. Answer (b) Flexor retinaculum

(B.D.C Vol. I, 4th Ed/ Pg.28)

(Question should have been structures attached to hook of hamate are/is:

Hook of hamate have the following attachments:

- o Flexor retinaculum (which is a strong band of fibrous tissue)
- o Flexor digiti minimi
- o Opponens digiti minimi

Pisiform has the following attachments:

- o Flexor carpi ulnaris
- o Flexor retinaculum
- o Abductor digiti minimi
- o Extensor retinaculum

The groove on trapezium gives insertion to flexor carpi radialis.

363. Answer (b) Median nerve

(B.D.C Vol. I, 4th Ed/ Pg. 29)

Dislocation of lunate may be produced by a fall on the acutely dorsiflexed hand with the forearm flexed, this displaces lunate anteriorly causing carpal tunnel syndrome which affects the median nerve supply in the hand.

364. Answer a,b,c,d(B.D.C Vol. I, 4th Ed/Pg.110)**Median nerve injury at elbow:**

Flexor pollicis longus- paralysed

Inability to bend the terminal phalanx of first finger

Flexion at the interphalangeal joints of the index and the middle fingers is lost so that the index and to lesser extent middle finger tend to remain straight while closing a fist.

Ape thumb deformity- paralysis of thenar muscles

365. Answer (b),(d)(B.D.C Vol. I, 4th Ed/Pg. 147)

- o The scapula is rotated by the combined action of trapezius and serratus anterior.
- o Abduction is initiated by supraspinatus and then the deltoid takes over for the further abduction (till 90 degrees) after which serratus anterior and trapezius (upper and lower fibres), cause the scapula to rotate over the chest resulting in overhead abduction.
- o Pain between 60-120 degrees of abduction suggests supraspinatus tendonitis or subacromial bursitis.
- o Abduction limited to 40-50 degree suggests tear of the supraspinatus tendon.

366. Answer (d)(B.D.C Vol. I, 4th Ed/Pg.127 fig.9.39)

A space lying medial to the fibrous septum attaching the palmar aponeurosis to the third metacarpal bone is called midpalmar space.

- o This septum is also called Intermediate palmar septum.
- o Tenosynovitis of middle and ring fingers or web infection spread proximally to lumbrical canals.
- o The normal concavity of the palm is obliterated and swelling extends to dorsum of hand.
- o Incision is given in the 3rd or 4th web depending on where the pus points.
- o The mid palmar space communicates with the forearm space of parona, giving rise to hour glass swelling, Pg.128.

367. Answer (a) Palmaris longus(Gray's Anatomy 39th Ed/Pg.877, B.D.C Vol. I, 4th Ed/Pg.102)

- o Palmaris longus is often absent on one or both sides.
- o It has been suggested that palmaris longus is a phylogenetically degenerate metacarpophalangeal joint flexor.
- o Its main function appears to be as an anchor for the skin and fascia of hand, in resisting horizontal forces in a distal direction

e.g. In holding a golf club, which would tend to deglove the skin of the hand.

- o It is absent in 10% subjects.

368. Answer a,b,c

(B.D.C Vol. I, 4th Ed/ Pg.148)

<u>Muscles</u>	<u>Origin</u>	<u>Insertion</u>
1. Brachialis	Lower halves of anteromedial and anterolateral surfaces of humerus.	Anterior surface of coronoid process including tuberosity of ulna.
2. Biceps brachii	Long head- supraglenoid tubercle Short head- lateral part of tip of coracoid process	Rough part of radial tuberosity on radius.
3. Brachioradialis	Upper 2/3 of lateral supracondylar ridge and lateral intramuscular septum.	Lateral side of radius just above styloid process.
4. Coracobrachialis	Tip of coracoid process	Middle 5cm of the medial border of humerus.

- o In order to act on a joint a muscle must cross the joint.
- o Coracobrachialis neither by virtue of it's origin nor it's insertion does it cross the elbow joint and so it does not have any effect on flexion of the elbow joint.

369. Answer (d)

(B.D.C Vol. I, 4th Ed/ Pg. 146, 79, 144)

- o Abduction of the shoulder is partly at the glenohumeral joint partly due to rotation of scapular over chest brought about by serratus anterior and trapezius.
- o Flexion, extension, adduction, abduction are movements of the shoulder joint.
- o Subacromial bursa is the largest bursa of the body, and is superior to the tendon of supraspinatus muscle.
- o The rotator cuff gives strength to the capsule of the shoulder jt. All around except inferiorly which explains why dislocations of the humerus occurs most commonly in the downward direction.

370. Answer (d) originates from the lower 8 ribs.

(B.D.C Vol. I, 4th Ed/ Pg. 47)

<u>Muscle</u>	<u>Origin</u>	<u>Insertion</u>	<u>Nerve supply</u>
Serratus anterior	Eight digitations from upper eight ribs	Costal surface of the scapula along it's medial border.	Long thoracic nerve of bell (C5 C6 C7)

- o The muscles along with trapezius helps in lifting arm above the shoulder by rotating scapula over the chest.
- o In paralysis the medial margin of scapula becomes prominent-'Winging of scapula', specially when pushing movements are attempted.

371. Answer (a) 5th year

(B.D.C Vol. I, 4th Ed/ Pg.18)

Lower end of humerus:

<u>Center for ossification</u>	<u>Appearance</u>	<u>Fusion with the shaft</u>
1. Medial epicondyle	4-6 years	20 th year
2. Capitulum and lateral flange of trochlea	1 st year	Fuses in the 14 th year to form one epiphysis.
3. Medial flange of trochlea	9 th year	
4. Lateral epicondyle	12 th year	16 years.

372. Answer (d) Extensor carpi radialis longus

(B.D.C Vol. I, 4th Ed/ Pg. 132, 118-119)

<u>Muscle</u>	<u>Origin</u>	<u>Insertion</u>
Extensor carpi radialis longus (ECRL)	o Lower 1/3 of suprascapular ridge	Dorsum of base of second metacarpal bone.
	o Supracondylar ridge of humerus	
	o Common extensor origin	
	o Lateral intermuscular septum	

- o ECRL thus cannot have an action on the middle distal phalanx or index finger.
- o Action of dorsal interossei is abduction of fingers and extension at interphalangeal and flexion at metacarpophalangeal jts.
- o Palmar interossei cause adduction of digits and extension at interphalangeal and flexion at metacarpophalangeal jts.

373. Answer (a) and (d)

(B.D.C Vol. I, 4th Ed/ Pg. 103, 104)

- o Flexor digitorum superficialis(FDS) is the main flexor of the proximal interphalangeal jts.
- o Secondarily it may also flex metacarpophalangeal and wrist jts.
- o Flexor digitorum profundus(FDP) flexes the distal phalanges after FDS has flexed the middle phalanges.
- o Secondarily it flexes other jts of the digits and fingers and wrist.
- o Lumbricals flex the MCP Jts and extend the IP Jts of the digit into which they are inserted.

374. Answer (d) Musculocutaneous nerve

(B.D.C Vol. I, 4th Ed/ Pg. 87, 88, fig 8.9)

Relations of the musculocutaneous nerve:

In the lower part of axilla:

- o Anterior- Pectoralis major
- o Posterior –Subscapularis
- o Medial- Axillary artery and lateral root of median nerve.
- o Lateral- Coracobrachialis.

In the arm:

- o Runs downward and laterally between the biceps and brachialis to reach lateral side of the tendon of biceps.

375. Answer (b) and (c)

(B.D.C Vol. I, 4th Ed/ Pg.47)

The clavipectoral fascia is pierced by the following structures:

- o Lateral pectoral nerve
- o Cephalic vein
- o Thoracoacromial vessels
- o Lymphatics passing from the breast and pectoral region to the apical group of axillary lymph nodes.

376. Answer (c)

(B.D.C Vol. I, 4th Ed/ Pg.122-123)

The deep palmar arch is formed mainly by the terminal part of the radial artery and is completed medially at the base of the fifth metacarpal bone by the deep palmar branch of ulnar artery.

The arch lies on:

- o Proximal parts of the shafts of metacarpals and on
- o Interossei

Under cover of:

- o Oblique head of adductor pollicis
- o Flexor tendons of fingers
- o Lumbricals.

377. Answer (b) Coracoid process

(B.D.C Vol. I, 4th Ed/ Pg.49)

The following structures form the boundaries of the apex of axilla:

- o Anterior –clavicle
- o Posterior- Superior border of scapula
- o Medial- outer border of first rib.

378. Answer (d) 7th cervical intersegmental artery.

(B.D.C Vol. I, 4th Ed/ Pg.165)

- o The axial artery of the upper limb develops from the 7th cervical intersegmental artery.
- o In adults it persists as the axillary, brachial, anterior interosseous artery and as deep palmar arch.
- o The other arteries are secondary outgrowths from the axial artery.

379. Answer (d) Anterior circumflex humeral artery,(B.D.C Vol. I, 4th Ed/ Pg.82)**Anastomosis around scapula is formed by :**

- o The suprascapular artery (a branch of thyrocervical trunk)
- o The deep branch of transverse cervical artery (a branch of thyrocervical trunk)
- o The circumflex scapular artery (a branch of subscapular artery which forms anastomosis with the deep branch of transverse cervical artery at the inferior angle of scapula).

380. Answer (c) Thoracodorsal branch of the subscapular artery(B.D.C Vol. I, 4th Ed/ Pg.42)**Blood supply of breast:**

- o *Internal thoracic artery also called as internal mammary artery is a branch of subclavian artery), supplies breast through it's perforating branches.
- o Branches of axillary artery
- o The lateral thoracic artery
- o The superior thoracic artery
- o The thoracoacromial artery
- o The lateral branches of posterior intercostal arteries.
- o Internal mammary arteries are used as grafts in coronary artery bypass surgery.

381. Answer (d) Long thoracic nerve(B.D.C Vol. I, 4th Ed/ Pg.47,208)

- o Long thoracic nerve is purely motor nerve supplying serratus anterior muscle.
- o Sural nerve is harvested for grafting on occasion because it is sensory only, and is easily identified, it is a branch of tibial nerve. (Gray's A 39th Ed/pg.1505)
- o The saphenous nerve is the largest cutaneous branch of the femoral nerve. The nerve may be subjected to an entrapment neuropathy as it leaves the adductor canal.(Gray's A 39th Ed/pg. 1487)
- o The lateral cutaneous branch of the second intercostals nerve is known as the Intercostobrachial nerve.Pg.208.

382. Answer (a) Adduction and external rotation(B.D.C Vol. I, 4th Ed/ Pg.16,146)**Muscles attached to the greater tubercle of humerus are:**

Muscles	Insertion	Action
Supraspinatus	Uppermost impression	Initiation of abduction
Infraspinatus	Middle impression	Lateral rotation
Teres minor	Lower impression	Lateral rotation

Remember: shoulder joint:

Movements	Main muscles	Nerve supply
Flexion	1. Clavicular head of pectoralis major 2. Anterior fibres of deltoid	Medial & lateral pectoral nerve Axillary nerve
Extension	1. Posterior fibres of deltoid 2. Latissimus dorsi	Axillary nerve Thoracodorsal nerve (C6 C7 C8)
Adduction	1. Pectoralis major 2. Latissimus dorsi 3. Short head of biceps Accessory muscles: 1. Teres major 2. Coracobrachialis	Medial and lateral pectoral nerve Thoracodorsal nerve Musculocutaneous nerve Lower subscapular nerve Musculocutaneous nerve
Abduction	1. Deltoid 2. Supraspinatus 3. Serratus anterior 4. Upper & lower fibres of trapezius	Axillary nerve Suprascapular nerve Long thoracic nerve of bell Spinal part of accessory nerve. Branches from C3 C4 are proprioceptive.
Medial rotation	1. Pectoralis major 2. Anterior fibres of deltoid 3. Latissimus dorsi 4. Teres major	Medial and lateral pectoral nerves Axillary nerve Thoracodorsal nerve Lower subscapular nerve
Lateral rotation	1. Posterior fibres of deltoid 2. Infraspinatus 3. Teres minor	Axillary nerve Suprascapular nerve Axillary nerve (this branch bears a pseudo ganglion)

383. Answer (d) Extensor carpi ulnaris

(B.D.C Vol. I, 4th Ed/ Pg. 153)

Wrist joint:

The main adductors of wrist joint are:

- o Flexor carpi ulnaris → Ulnar nerve
- o Extensor carpi ulnaris → PIN

Flexion:

- o Flexor carpi radialis → Median nerve
- o Flexor carpi ulnaris → Ulnar nerve
- o Palmaris longus → Median nerve

Extension:

- o Extensor carpi radialis longus(ECRL)---->Radial nerve
- o Extensor carpi radialis brevis(ECRB)---->PIN
- o Extensor carpi ulnaris---->PIN

Abduction:

- o Flexor carpi radialis---->Radial nerve
- o ECRL & ECRB---->PIN
- o Abductor pollicis longus---->PIN
- o Extensor pollicis brevis---->PIN.

384. Answer (a) C5, C6(B.D.C Vol. I, 4th Ed/ Pg.53)

- o The region of the upper trunk of the brachial plexus is called erb's point.
- o Six nerves meet at this point.
- o Nerve roots involved are mainly C5 and C6.
- o Injury at this point causes Erb's paralysis.
- o Causes include:
 - Birth injury
 - Fall on shoulder
 - During anaesthesia
- o Muscles paralysed:
 - Biceps > Musculocutaneous nerve (C5-C7)
 - Deltoid > Axillary nerve (C5, C6)
 - Brachialis > Musculocutaneous nerve (C5-C7)
 - Brachioradialis > Radial nerve (C5 C6 C7)

Partly paralysed:

- Supraspinatus > Suprascapular nerve (C5 C6)
- Infraspinatus > Suprascapular nerve (C5 C6)
- Supinator > PIN (C6 C7)

Klumpke's paralysis:

Undue abduction of arm can cause injury to lower trunk of brachial plexus, affecting mainly (T1) and partly (C8), causing paralysis of:

- o Intrinsic muscles of hand
- o Ulnar flexors of wrist and, fingers

Can also cause *Horner's syndrome* because of injury to sympathetic fibres that leave the spinal cord through T1.

385. Answer (a) & (e)(B.D.C Vol. I, 4th Ed/ Pg. 116,117,125)The 3 muscles of thenar eminence are:

- o Abductor pollicis brevis----> Median nerve (C8, T1)
- o Flexor pollicis brevis----> Median nerve (C8 T1), deep head may be supplied by deep branch of ulnar nerve.

- o Opponens pollicis----→ Median nerve (C8, T1).

386. Answer (a) struther's ligament

(B.D.C Vol. I, 4th Ed/ Pg.86)

- o The coracobrachialis represents the medial compartment of the arm.
- o In some animals it is tricipital
- o In man the upper heads have fused and the musculocutaneous nerve passes between them.
- o The third and the lowermost head is called '*ligament of Struther's*', a fibrous band extending from the troclear spine to the medial epicondyle of humerus.
- o Lower part of pronator teres takes its origin from the same ligament.
- o The median nerve and brachial artery pass subjacent to it.

387. Answer (c) Flexor digitorum superficialis

(B.D.C Vol. I, 4th Ed/ Pg.27)

The pisiform bone give attachment to:

- o Flexor retinaculum
- o Flexor carpi ulnaris----→Ulnar nerve.
- o Abductor digiti minimi----→Ulnar nerve.
- o Extensor retinaculum

388. Answer (c) Flexor pollicis longus

(B.D.C Vol. I, 4th Ed/ Pg.103, 104)

Anterior interosseous nerve(C8 T1) supplies:

- o Lateral half of flexor digitorum profundus.
- o Flexor pollicis longus
- o Pronator quadratus.

389. Answer (b) Difficulty in initiation of abduction

(B.D.C Vol. I, 4th Ed/ Pg.147)

- o Abduction at the shoulder joint is initiated by the supraspinatus, and deltoid is the main abductor.
- o The articular surface of the head allows abduction only till 90 degrees.
- o After this there is lateral rotation of humerus and head comes under coracoacromial arch.
- o After which the serratus anterior and upper and lower fibres of trapezius cause overhead abduction.
- o The humerus and scapula move in a ratio of 2:1 throughout abduction.

390. Answer (a) Anterior set

(B.D.C Vol. I, 4th Ed/ Pg.57, 58)

<u>Group of lymph nodes</u>	<u>Situated at:</u>	<u>Receive lymph from:</u>
1. Anterior or pectoral group	Along lateral thoracic vessels Along lower border of pectoralis minor in direct contact with the axillary tail of breast.	Upper half of anterior wall of trunk and major part of breast.
2. Posterior scapular group	Along subscapular vessels	Posterior wall of upper half of trunk and axillary tail of breast.
3. Lateral group	Along upper part of humerus medial to axillary vein	Upper limb
4. Central group	Lie in the fat of upper axilla	Preceding group and drain into apical group.
5. Apical/ Infraclavicular group	Lie deep to clavipectoral fascia along axillary vessels	- Central group - Upper part of breast - Thumb and it's web.

391. Answer (d) T7(B.D.C Vol. I, 4th Ed/Pg.59, Gray's A 39th Ed/Pg.819)

The inferior angle of scapula lies over the seventh rib or over the seventh intercostals space, (which is at the level of T7 of the vertebral column).

392. Answer (b) Flat shoulder(B.D.C Vol. I, 4th Ed/Pg.82)

- o The rounded contour of the shoulder is because of the deltoid muscle.
- o Deltoid is supplied by the Axillary nerve.
- o Axillary nerve is damaged by dislocation of shoulder joint or fracture or the surgical neck of humerus, due to its relation with it.
- o This results in the loss of abduction at the shoulder joint and disuse atrophy of deltoid muscle, due to which the greater tubercle of humerus becomes prominent, and thus even the contour of shoulder is lost and results in flattening of shoulder.

393. Answer (d) ulnar nerve

(B.D.C Vol. I, 4th Ed/ Pg.113)

The structures passing deep to flexor retinaculum are:

- o The Median nerve
- o Tendons of flexor digitorum superficialis and
- o Tendons of flexor digitorum profundus.
- o Tendons of flexor pollicis longus.
- o Ulnar bursa
- o Radial bursa

In fact ulnar nerve passes through Guyon's canal, under the superficial part of the flexor retinaculum which is a slip given by the flexor retinaculum medially under which the ulnar nerve travels with the ulnar artery.

Ulnar tunnel syndrome is an entrapment neuropathy of the ulnar nerve, the causes of which include:

- o Ganglion
- o Trauma
- o Proximity of aberrant or accessory muscles (Gray's A 39th Ed/ Pg.933, fig. 53.58)

Miscellaneous

Questions

394. Lesser superficial petrosal nerve supplies ___ gland - (TN 91)
a. Parotid
b. Submandibular salivary
c. Sublingual salivary
d. Lacrimal
395. The relation of facial nerve branches to parotid gland is ___ (AI 93)
a. Deep
b. Superficial
c. In the substance of parotid
d. None
396. Parathyroid glands develop from ___ branchial pouches - (AMC 88)
a. 1st and 2nd
b. 2nd and 3rd
c. 3rd and 4th
d. 5th and 6th
397. Which of the following are features of Horner's syndrome - (PGI 85)
a. Ptosis
b. Miosis
c. Mydriasis
d. Anhydrosis
398. Following foramina are found in greater wing of sphenoid except - (AIIMS 81, Rohtak 88)
a. Rotundum
b. Ovale
c. Spinosum
d. Optic canal
399. Which of the following could result from a destructive lesion of the left oculomotor nerve - (PGI 81,82)
a. Loss of left pupillary constriction when light is shone in the left eye
b. Loss of left pupillary constriction when light shone in the eye
c. Pupillary dilation (mydriasis) in the left eye
d. Paralysis of the ciliary muscle in the left eye
e. None

400. The oculomotor nerve supplies the muscle of the eye except - (PGI 83)
- Lateral rectus.
 - Superior oblique
 - Superior rectus
 - Inferior rectus
401. The posterior 1/3rd of tongue is supplied by ___ nerve (AIIMS 84)
- Hypoglossal
 - Chorda tympani
 - Lingual nerve
 - Glossopharyngeal nerve
402. Stapedius muscle is supplied by ___ nerve (PGI 84)
- Facial
 - Vagus
 - Glossopharyngeal
 - Trochlear
403. Which laryngeal cartilage is above glottis (PGI 84)
- Arytenoid
 - Epiglottis
 - Cricoid
 - Thyroid
404. Internal carotid artery at the bifurcation from the common carotid artery is - (PGI 85, AMC 86)
- Lateral to the external carotid
 - Medial to external carotid
 - Posterior to external carotid
 - Anterior to external carotid
405. Number of branches of the internal carotid artery in the neck is - (PGI 85, UPSC 85)
- 1
 - 2
 - 3
 - 4
 - None
406. Damage to the external laryngeal nerve results in - (PGI 85)
- Hoarseness
 - Loss of timbre of voice
 - Anaesthesia of the larynx
 - Breathing difficulty

- 407. The left subclavian artery is a branch of - (ROHTAK 85)**
a. Brachiocephalic trunk
b. Ascending aorta
c. Arch of aorta
d. Left common carotid
- 408. The largest ganglion in the neck is - (JIPMER 86)**
a. Superior ganglion
b. Middle ganglion
c. Stellate ganglion
d. Second thoracic ganglion
- 409. Stensens duct opens at the - (AP 86, UPSC 88, Kerala 88)**
a. Upper 3rd molar teeth
b. Upper 1st molar teeth
c. Upper 2nd molar teeth
d. Upper 1st premolar teeth
- 410. Cricothyroid is supplied by : (NIMHANS 86, Karnataka 89)**
a. Recurrent laryngeal nerve
b. Internal laryngeal nerve
c. External laryngeal nerve
d. Hypoglossal nerve
- 411. The cavernous sinus communicates directly with all, except - (AIIMS 86)**
a. Inferior petrosal sinus
b. Pterygoid venous plexus
c. Veins in orbit
d. Sigmoid sinus and straight sinus
- 412. Main arterial supply of the tonsil is from : (TN 87, PGI 87, Kerala 87, 90)**
a. Facial artery
b. Ascending pharyngeal artery
c. Palatine artery
d. Maxillary artery
- 413. The level of branching of the common carotid artery is - (PGI 88)**
a. Upper border of thyroid cartilage
b. Lower border of cricoid
c. Upper border of cricoid
d. Hyoid

272. Anatomy

- 414. Which of the following regarding mandibular nerve is correct - (AI 89)**
- a. Branch of facial nerve
 - b. Purely motor
 - c. Passes through foramen ovale
 - d. Related to sphenopalatine ganglion
- 415. The actions of superior oblique muscle is - (PGI 89)**
- a. Abduction
 - b. Intorsion
 - c. Extorsion
 - d. Depression
- 416. The facial nerve - (KARNATAKA 89)**
- a. Arises from the medulla oblongata
 - b. Traverses through parotid gland
 - c. Supplies muscles of mastication
 - d. Carries no taste fibres
- 417. Structures passing through the foramen magnum are - (PGI 89)**
- a. Spinal cord
 - b. Vertebral artery
 - c. Internal jugular vein
 - d. XI cranial nerve
- 418. The oesophagus commences at the following level (AP 89)**
- a. Lower end of cricoid
 - b. C5 vertebra
 - c. 10 cm from incisor teeth
 - d. C7
- 419. Corresponding to the vas in males, which structure penetrates the inguinal ring in females - (PGI 88)**
- a. Round ligament
 - b. Inguinal ligament
 - c. Broad ligament
 - d. Cardinal ligament
- 420. Middle rectal artery is a branch of __ artery. (PGI 88)**
- a. Internal iliac
 - b. Internal pudendal
 - c. External iliac
 - d. Femoral

421. The blood supply of the jejunum is through the - (PGI 88)

- a. Inferior mesenteric artery
- b. Superior mesenteric artery
- c. Pancreato duodenal artery
- d. Ileocolic artery

422. Irritation of the diaphragm radiates to the which of the following segments - (AP 97)

- a. C3-4
- b. C1-2
- c. C6-7
- d. C8-9

423. Over 75% of the strength of the intact abdominal wall is in the - (UPSC 95)

- a. Skin
- b. Subcutaneous tissue
- c. Aponeurosis
- d. Peritoneum

424. In hydrocele aspiration, the needle passes through all of the following layers except - (DELHI PG 96)

- a. Dartos
- b. Tunica albugenia
- c. Tunica vaginalis
- d. External spermatic fascia

425. As a rule, all prostatic arteries are branches of the - (PGI 78, AIIMS 91)

- a. Inferior vesical
- b. Dateral
- c. Superior vesical
- d. Internal pudendal

426. The common bile duct - (PGI 80)

- a. Passes anterior to the first part of the duodenum
- b. Is situated anterior to the portal vein
- c. Opens into the third part of duodenum
- d. Is separated from the inferior vena cava by the epiploic foramen

274 Anatomy

- 427. Which of the following statements concerning the anterior abdominal wall is/ are correct ? (PGI 80)**
- a. The fibres of external and internal oblique muscles are oriented perpendicular to one another
 - b. A function of the rectus abdominis muscle is extension of the vertebral column
 - c. The muscles are innervated partially by lower intercostal nerves
 - d. Contraction of its muscles reduces intra abdominal pressure
- 428. Which of the following statements relative to the gall bladder are / is true ? (PGI 80)**
- a. Its fundus is normally situated on the transpyloric line at the tip of the ninth costal cartilage
 - b. It occupies a groove that separates the right and quadrate lobes of the liver
 - c. It is related posteriorly to the first part of the duodenum
 - d. Its arterial supply is typically derived from the left hepatic artery
- 429. It can be said that the intervertebral foramen (AIIMS 84)**
- a. Are narrow towards the lower part of lumbar region
 - b. Transmits lumbar and sacral spinal nerves
 - c. Admit spinal arteries
 - d. Are located between the laminae and the articular process
- 430. The following about prostate is true except (AIIMS 84)**
- a. Surrounds the neck of bladder
 - b. Has an anterior lobe which hypertrophies in old age
 - c. Has median lobe between urethra and ejaculatory ducts
 - d. Has a posterior lobe which is prone to carcinomatous change
- 431. The coeliac axis arises from the aorta opposite the ____ vertebra -(AIIMS 85)**
- a. T 12 & L1
 - b. L1
 - c. L2
 - d. L3
- 432. The broad ligament of the uterus has running in it (AMC 85)**
- a. Uterine vessels
 - b. Uterine tubes
 - c. Ovarian ligament
 - d. All of the above

433. Parasympathetic supply to rectum and anal canal - (PGI 86, UPSC 86)
- a. L4, L5, S1
 - b. L5, S1, S2
 - c. S1, S2, S3
 - d. S2, S3, S4
434. Left testicular vein drains into the - (AIIMS 87, Delhi 87)
- a. Left renal vein
 - b. I.V.C
 - c. Rt. renal vein
 - d. Int. iliac vein
 - e. Ext. iliac vein
435. Which of the following statements concerning the function of the muscle of the anterior abdominal wall are true - (PGI 87)
- a. They laterally flex and rotate the vertebral column
 - b. They assist the diaphragm during inspiration
 - c. They support and protect the abdominal viscera
 - d. They assist in increasing the intra abdominal pressure during micturition and defecation
436. Length of the inguinal canal is - (PGI 87)
- a. 2cm
 - b. 3.75 cm
 - c. 4.5 cm
 - d. 5 cm
 - e. 6 cm
437. The smallest branch of the coeliac axis is - (PGI 87)
- a. Splenic
 - b. Common hepatic
 - c. Left gastric
 - d. Gastric - epiploic
438. Hasselbach's triangle is - (PGI 87)
- a. Inguinal triangle
 - b. Sacral triangle
 - c. Anal triangle
 - d. Carotid triangle
439. The contents of the inguinal canal passing through the int. ring are all except - (AI 88, PGI 87)
- a. Ilioinguinal nerve
 - b. Vas deferens
 - c. Pampiniform plexus
 - d. Inferior epigastric artery

276 Anatomy

440. Pouch of Douglas is situated between - (AI 88)

- a. Bladder and uterus
- b. Bladder and pubic symphysis
- c. Bladder and rectum
- d. Uterus and rectum

441. Structures related to lesser omentum are - (PGI 88)

- a. Vagus
- b. Hepatic artery
- c. Hepatic vein
- d. Portal vein

442. The rectus sheath contain the following important structures except - (DNB 89)

- a. Terminal branches of lower intercostal nerves
- b. Inferior epigastric artery
- c. Lymph vessels
- d. Ilioinguinal nerve

443. The superior mesenteric artery - (AP 89)

- a. Typically arises from the aorta just inferior to the origin of the gonadal (testicular or ovarian) arteries
- b. Supplies the entire duodenum
- c. Passes between pancreas and the second part of duodenum
- d. Supplies the jejunum, appendix and ascending and transverse portions of the colon

444. Left gastroepiploic artery is a branch of - (AI 89)

- a. Coeliac axis
- b. Hepatic artery
- c. Splenic artery
- d. Left gastric artery

445. Regarding trigone of bladder, which is incorrect ? (AI 89)

- a. Bordered by interuretic crest
- b. Mesoderm in origin
- c. Mucus membrane has folds
- d. Overlies the median lobe of prostate

446. The policeman of the abdomen is - (UPSC 89)

- a. Peritoneum
- b. Greater omentum
- c. Appendices epiploicae
- d. Taenia coli

- 447. Which of the following statements are true concerning the rectus abdominis muscle - (PGI 91)**
- a. It arises by three heads from the front of the symphysis pubis, the pubic crest and the pubic tubercle
 - b. It is inserted into the eighth, ninth and tenth costal cartilage
 - c. The tendinous intersection are attached to the posterior wall of the rectus sheath
 - d. It is innervated by the lower six intercostal nerves
- 448. Perineal body is formed by all except - (AI 91)**
- a. Levator ani muscle
 - b. External anal sphincter muscle
 - c. Bulbo spongiosus muscle
 - d. Obturator internus muscle
- 449. Which is true regarding ureter - (JIPMER 91)**
- a. Anterior to genitofemoral nerve
 - b. Anterior to gonadal vessels
 - c. Anterior to internal iliac artery
 - d. Anterior to attachment of mesentery
- 450. The inferior mesenteric artery supplies all of the following organs except the - (DNB 91)**
- a. Ascending colon
 - b. Descending colon
 - c. Transverse colon
 - d. Sigmoid colon
- 451. The hilus of the right kidney contains the following structures - (PGI 92)**
- a. Branches of the renal artery
 - b. Renal pelvis
 - c. Sympathetic nerve fibres
 - d. Tributaries of the renal vein
- 452. The following is false regarding rectus sheath - (AIIMS 92)**
- a. Contains pyramidalis
 - b. Deficient anterosuperiorly
 - c. Posterior wall formed by transversalis fascia
 - d. Inferior epigastric artery pierces posteroinferiorly
- 453. Which is not a tributary of left Renal vein - (AI 92)**
- a. Inferior phrenic
 - b. Left gonadal
 - c. First lumbar
 - d. Left supra renal

- 454. Internal pudendal artery in a female is a branch of - (Delhi 92)**
- a. Internal iliac artery
 - b. Uterine artery
 - c. External iliac artery
 - d. Common iliac artery
- 455. Which of the following structures is not present in transpyloric plane - (JIPMER 95)**
- a. L1 vertebra
 - b. Tip of ninth costal cartilage
 - c. Fundus of gall bladder
 - d. Right supra renal gland
- 456. Distal femoral epiphysis is seen at the age of - (JIPMER 80, Delhi 87)**
- a. Just after birth
 - b. 10 weeks
 - c. 20 weeks
 - d. 34 weeks
- 457. Abduction and adduction of the fore foot occurs at (PGI 03)**
- a. Subtalar joint
 - b. Midtarsal joint
 - c. Inferior tibiofibular joint
 - d. None
- 458. The longest vein in the body is (AIIMS 85)**
- a. I.V.C
 - b. Cephalic
 - c. Basilic
 - d. Long saphenous
- 459. The number of perforators of the great saphenous vein in the leg is - (AIIMS 85)**
- a. 2
 - b. 3
 - c. 4
 - d. 5
- 460. Sartorius muscle takes origin from - (AP 86, Delhi 86)**
- a. Pectinate line
 - b. Ant. superior iliac spine
 - c. Body of the ileum
 - d. Ischial tuberosity

- 461. Where does superficial femoral artery become the popliteal artery - (TN 87)**
- a. At the apex of femoral triangle
 - b. At the hiatus in adductor magnus
 - c. Within the adductor canal
 - d. None of the above
- 462. Floor of the femoral triangle is formed by the following muscles, except the - (AMU 88)**
- a. Pectenous
 - b. Adductor longus
 - c. Iliacus
 - d. Adductor brevis
- 463. Pain from hip joint is referred to the (PGI 88)**
- a. Back
 - b. Knee joint
 - c. Calf
 - d. All of the above
- 464. Fascia cribrosa is related to - (Rohtak 88)**
- a. Inguinal ring
 - b. Femoral Triangle
 - c. Neck
 - d. Thigh
- 465. Popliteal muscle forms the__ of the popliteal fossa**
- a. Roof
 - b. Floor
 - c. Upper boundary
 - d. Lower boundary
- 466. The peroneal artery is a branch of which artery (CMC 89)**
- a. Anterior tibial artery
 - b. Popliteal artery
 - c. Posterior tibial artery
 - d. Arcuate artery
 - e. Lateral plantar artery
- 467. Foreign body aspiration most commonly enters - (TN 98)**
- a. Right main bronchus
 - b. Left main bronchus
 - c. Can enter both equally
 - d. None of the above

- 468. The length of an adult trachea is - (AIIMS 81, DNB 83)**
- a. 6 to 8cm
 - b. 10 to 11cm
 - c. 14 to 15cm
 - d. 16 to 20cm
- 469. Anterior interventricular artery is a branch of __ artery (JIPMER 80, Delhi 86)**
- a. Right marginal
 - b. Pulmonary trunk
 - c. Right coronary
 - d. Left coronary
- 470. The terminal branches of the internal mammary artery are - (PGI 83)**
- a. Superior epigastric
 - b. Right gastroepiploic
 - c. Musculophrenic
 - d. Superior pancreaticoduodenal
- 471. The thoracic duct crosses from right to the left at the level of - (PGI 86, AI 88)**
- a. T12 vertebra
 - b. T6 vertebra
 - c. T4 vertebra
 - d. T2 vertebra
 - e. C7 vertebra
- 472. Broncho pulmonary segment contain all except (AIIMS 89)**
- a. Independent pulmonary artery
 - b. Independent pulmonary vein
 - c. Tertiary bronchiole
 - d. Conical segment
- 473. Right middle lobe consists of which broncho-pulmonary segment - (Delhi 93)**
- a. Superior and inferior
 - b. Medial and lateral
 - c. Anterior and posterior
 - d. Apical & lateral
- 474. If a foreign body enters in to the nose accidentally it enters - (JIPMER 95)**
- a. Apical segment of rt. lower lobe
 - b. Medial segment of rt. middle lobe
 - c. Basal segment of lt. lung
 - d. Posterior segment of rt. lower lobe

475. Sensory nerve supply of trachea is (Kerala 96)

- a. Superior laryngeal nerve
- b. Recurrent laryngeal nerve
- c. Internal laryngeal nerve
- d. Both recurrent laryngeal and internal laryngeal nerve
- e. Glossopharyngeal nerve

476. The most dependant part of the lung in the supine position is - (CUPGEE 96)

- a. Upper apical
- b. Lower apical
- c. Basal
- d. Upper anterior

477. In the post natal period the greatest growth in the grey matter of the C.N.S is of (Karnataka 2001)

- a. Neuron cell number
- b. Length of axon
- c. Dendritic tree
- d. Size of perikaryon

478. The lesion of klumpke's paralysis is in - (AP 88)

- a. Cervical plexus
- b. Lower brachial
- c. Upper brachial
- d. Sacral plexus

479. Dorsum of the middle finger is supplied by - (Kerala 90)

- a. Radial nerve
- b. Median nerve
- c. Ulnar nerve
- d. (a) and (b)

480. Brachialis is supplied by -(NIMS 96)

- a. Radial and ulnar nerve
- b. Radial and musculocutaneous nerve
- c. Median nerve and musculocutaneous nerve
- d. Radial and median nerve

481. Extension of the metacarpophalangeal joint is lost in injury to - (AIMS 2K)

- a. Radial nerve
- b. Ulnar nerve
- c. Median nerve
- d. Posterior interosseous nerve

482. True flexors of the elbow joint are - (PGI 85)

- a. Biceps
- b. Brachialis
- c. Brachioradialis
- d. Teres minor

483. The following is true of brachial plexus - (Kerala 89)

- a. Cervical rib involves lateral cord
- b. Musculocutaneous nerve arises from medial cord
- c. Radial nerve arises from posterior cord
- d. Post fixed plexus is formed by C4,5,6,7,8, T1

484. Cancer breast of upper outer quadrant mostly spreads to- (MAHE 2001)

- a. Anterior axillary
- b. Posterior axillary
- c. Pectoral
- d. Internal mammary

485. Clavicular part of deltoid is associated with (AIIMS 80, AMU 87)

- a. Flexion
- b. Medial rotation
- c. Abduction
- d. Adduction

486. Relation of musculo cutaneous nerve with axillary artery in axilla is-

- a. Lateral
- b. Medial
- c. Anterior
- d. Posterior

487. The optic foramen is located between - (AIIMS - 89)

- a. Greater wing and lesser wing of sphenoid
- b. Greater wing and body of sphenoid
- c. Lesser wing and body of sphenoid
- d. Lesser wing of sphenoid and ethmoid

488. All of the following statements regarding the oculomotor nerve are true except (CUPGE 97)

- a. It accommodates the eye
- b. It raises the upper eyelid
- c. It innervates the lateral rectus
- d. It constricts the pupil

489. The lacrimal duct opens at the - (PGI 85)
- Superior turbinate
 - Middle meatus
 - Inferior meatus
 - None of the above
490. Sensory nerve supply of the middle ear cavity is provided by - (AI 95)
- Facial
 - Glossopharyngeal
 - Vagus
 - Trigeminal
491. Structures passing between the upper border of superior constrictor muscle and the base of the skull are-(AIIMS 84)
- Styloid ligament and Eustachian tube
 - Superior laryngeal nerves and vessels
 - Styloid ligament and superior laryngeal nerve
 - Levator palati muscle and the cartilaginous Eustachian tube
492. The recurrent laryngeal nerve is closely related to - (PGI 89)
- Superior laryngeal artery
 - Inferior thyroid artery
 - Middle thyroid vein
 - Superior thyroid artery
493. The cervical esophagus receives it's blood supply from (PGI 80, Delhi 84)
- Superior thyroid artery
 - Inferior thyroid artery
 - Facial artery
 - Lingual artery
 - Bronchial artery
494. Throat pain radiating to the ear following tonsillectomy is due to : (AIIMS 92)
- Persisting infection
 - Injury to IX nerve
 - Injury to X nerve
 - Injury to Eustachian tube
495. Skin at the angle of jaw is supplied by - (AI 92)
- Mandibular nerve
 - Maxillary nerve
 - Greater auricular nerve
 - Transverse cutaneous nerve of neck

496. If the greater tuberosity of the humerus is lost which of the following movements will be affected (AIIMS 2K)
- Adduction and flexion
 - Abduction and lateral rotation
 - Medial rotation and adduction
 - Flexion and medial rotation
497. Following an incised wound in front of wrist, the subject is unable to oppose the tips of the little finger and the thumb. The nerve (s) involved in / are - (UPSC 2K)
- Ulnar nerve alone
 - Median nerve alone
 - Median and ulnar nerves
 - Radial & Ulnar nerves
498. The retina is an out growth of the - (DNB 89)
- Mesencephalon
 - Diencephalon
 - Telencephalon
 - Pons
499. Which vertebra has the most prominent spine -
- C2
 - C7
 - T10
 - L2
500. Pelvic splanchnic nerve is formed by - (PGI 98)
- Posterior rami of L5- S1
 - Posterior rami of S2,S3,S4
 - Anterior rami of L5,S1,S3
 - Anterior rami of S2,S3,S4
501. Blood supply of left ureter are - (PGI 03)
- Uterine artery
 - Inferior vesical artery
 - Testicular artery
 - Common iliac artery
 - External femoral artery

Miscellaneous

Answers

394. (a) Parotid

(Ref : BDC 4th/e Vol III pg 137)

Parotid gland :-

Nerve supply :-

- (a) Parasympathetic
- (b) Sympathetic
- (c) Sensory

The lesser petrosal nerve is a part of the parasympathetic supply to the parotid gland, which is as follows : The parasympathetic fibres travel through :

Inferior salivatory nucleus



Glossopharyngeal nerve



Its tympanic branch



Tympanic plexus



Lesser petrosal nerve



Relay of otic ganglion (Post ganglionic fibres originate here)



Auriculotemporal nerve



Parotid gland

395. (c) In the substance of parotid

(Ref : BDC 4th/e. III Pg 136)

Structures within the parotid gland :-

From medial to lateral side :-

(1) Arteries :

- (a) External carotid artery enters through its posteromedial surface
- (b) The maxillary artery leaves through its anteromedial surface
- (c) Superficial temporal vessels emerge at the anterior part of superior surface
- (d) Posterior auricular artery may arise within the gland

(2) Veins :

- (a) Retromandibular vein by union of Superficial temporal & maxillary vein, within gland
- (3) Facial nerve - Enters through upper part of posteromedial surface, divides into its terminal branches within the gland
- (4) Parotid lymph nodes

396. (c) 3rd and 4th

(Ref : BDC 4th/e Vol III pg 171)

- ♦ There are 2 pairs (superior and inferior) of small endocrine glands, that usually lie on the posterior border of the thyroid gland, within the false capsule
- ♦ The superior parathyroids - preferred to as parathyroid IV Since they develop from the endoderm of the fourth pharyngeal pouch (4th)
- ♦ The inferior parathyroids → parathyroid III since they develop from the third pouch
- ♦ So remember SP4 and IP3

397. (a) Ptosis

(b) Miosis

(d) Anhydrosis

(Ref : BDC 4th/e, Vol III/ Pg 191, 192 4th/e Vol I Pg 53)

- ♦ The head and the neck are supplied by the sympathetic nerves arising from the upper 4 thoracic segments of the spinal cord, most of these preganglionic fibres pass through the stellate ganglion to relay in superior cervical ganglion
- ♦ Injury to the cervical sympathetic trunk produces Horner's syndrome
- ♦ Also a lesion involving the sympathetic fibres at or above the T1 segment of spinal cord can produce Horner's syndrome
- ♦ Manifestations of Horner's syndrome are :-
 - (1) Ptosis
 - (2) Miosis
 - (3) Anhydrosis
 - (4) Enophthalmos
 - (5) Loss of ciliospinal reflex

398. (d) Optic canal

(Ref : BDC - Vol III 4/e PG 22)

The greater wing of sphenoid presents the following :-

- (a) Foramen Rotundum
- (b) Foramen ovale
- (c) Foramen spinosum
- (d) Foramen of vésalius (or) Emissary sphenoidal foramen

- (e) The groove for middle meningeal vessels leads forwards from the foramen spinosum.

The body of sphenoid presents the following :-

- (a) Sulcus chiasmaticus (or) optic groove
- (b) The sella turcica
- (c) The optic canal - which leads to the orbit. It is bounded laterally by the lesser wing of sphenoid, in front and behind by the two roots of the lesser wing, and medially by the body of sphenoid.

399. (a) Loss of left pupillary constriction when light is shone in the left eye

- (b) Loss of left pupillary constriction when light is shone in the eye
- (c) Pupillary dilatation (mydriasis) in the left eye
- (d) Paralysis of the ciliary muscle in the left eye

(Ref : Gray's Anatomy 39th/e pg 351)

◆ Unilateral herniation is heralded by a progressive oculomotor nerve palsy (Ophthalmoplegia, pupillary dilatation and ptosis), contralateral limb weakness, falling level of consciousness and, if treatment is long delayed, a contralateral homonymous hemianopia.

◆ Compression of the contralateral brain stem by the tentorium leads to ipsilateral 'false localizing' signs

(BDC, 4th/e, Vol III/ Pg 113)

◆ Complete and total paralysis of 3rd nerve results in :

- (a) Ptosis
- (b) Lateral squint
- (c) Dilatation of the pupil
- (d) Loss of accommodation
- (e) Slight proptosis i.e. forward projection of eye
- (f) Diplopia (or) double vision

◆ A midbrain lesion causing contralateral hemiplegia and ipsilateral paralysis of 3rd nerve is known as **Weber's syndrome**

◆ Supranuclear paralysis of 3rd nerve causes loss of conjugate movement of the eyes

400. (a) Lateral rectus

- (b) Superior oblique

(Ref : BDC 4th/e Vol III, Pg 113)

Oculomotor nerve has two divisions :-

In the orbit:

The smaller upper division ascends on the lateral side of the optic nerve, and supplies the superior rectus and the levator palpebrae superioris

The larger lower division divides into 3 branches for the :-

- Medial rectus

- The inferior rectus
 - Inferior oblique
 - ♦ The nerve to inferior oblique is longest
 - ♦ It also gives off the motor root to ciliary ganglion
- Note :- Paralysis of levator palpebrae superioris also cause ptosis and so does paralysis of muller's muscle in Horner's syndrome, the distinguishing factor being the pupil.

401. (d) Glossopharyngeal nerve

(Ref : BDC, Vol III, pg 253)

TONGUE :-

- ♦ The hypoglossal nerve is motor to tongue muscles
- ♦ The sensory nerve supply :-
 - Anterior 2/3 rd → Lingual Nerve
 - Posterior 1/3rd → Glossopharyngeal nerve
- ♦ The taste sensations :-
 - Anterior 2/3rd → Chorda tympani except vallate papillae
 - Posterior 1/3 rd → Glossopharyngeal including the vallate papillae

Posterior most part (or) vallecula :-

- ♦ Sensory → Internal laryngeal branch of vagus
- ♦ Taste → Internal laryngeal branch of vagus

402. (a) Facial Nerve

(Ref : BDC, Vol III, Pg 263)

Muscle of the middle ear :-

There are two muscles :-

- (1) The tensor tympani
- (2) Stapedius

Both act simultaneously to damp down the intensity of high pitched sound waves & thus protects the internal ear

Nerve supply :-

- (1) Tensor tympani - Mandibular nerve (the fibres pass through nerve to the medial pterygoid and otic ganglion without any relay)
 - It develops from mesoderm of 1st branchial arch
- (2) Stapedius :- Facial nerve
 - It develops from the mesoderm of 2nd branchial arch
(So remember - T1S2 - middle ear)

403. (b) Epiglottis

(Ref : BDC, Vol III, Pg 240,242)

- ♦ The orientation of the larynx and its inlet is important to know, which is looking backwards and upwards and has the epiglottis anteriorly and posteriorly the interarytenoid fold of mucous membrane and on each side the ary- epiglottic fold bounding this inlet.

- ◆ The vestibular and vocal folds divide the cavity of the larynx into three parts :-
- (a) The part above the vestibular fold is called the vestibule of the larynx
- (b) The part between the vestibular and vocal folds is called the sinus (or) ventricle of the larynx
- (c) The part below the vocal folds is called the infraglottic part
- ◆ Epiglottis is a leaf - shaped cartilage placed in the anterior wall of the upper part of the larynx

404. (a) Lateral to the external carotid

(c) Posterior to external carotid

(Ref : BDC 4th/e, Vol III, Pg 178)

In the carotid triangle the external carotid artery is anteromedial to the internal carotid artery

i.e. - Internal carotid artery is lateral to the external carotid artery and also posterior to it

405. (e) None

(Ref : BDC 4th/e, Vol III, pg 177)

Internal carotid artery is the principal artery of the brain and the eye. It also supplies the related bones and meninges.

Cervical part :-

It ascends vertically in the neck from its origin to the base of the skull to reach the lower end of the carotid canal. This part is enclosed in the carotid sheath (with the internal jugular vein & vagus)

- ◆ No branches arise from the internal carotid artery in the neck
- ◆ It's initial part usually shows a dilation, the carotid sinus which acts as a baroreceptor
- ◆ The lower part of the artery (in the carotid triangle) is comparatively superficial. The upper part above the posterior belly of the digastric, is deep to the parotid gland, the styloid apparatus, and many other structures.

406. (b) Loss of timbre of voice

(Ref : BDC 4th/e Vol III, Pg 247)

Damage to :-

- (1) Internal laryngeal nerve → Anaesthesia of mucous membrane of supraglottic part of larynx
- (2) External laryngeal nerve → - Weakness of phonation
- Loss of tightening effect of the cricothyroid on vocal cord
- (3) Both recurrent nerves → - Vocal cords in cadaveric position
- Phonation completely lost
- Breathing difficulty

- One recurrent laryngeal nerve →- Hoarseness of voice
- Opposite vocal cord compensates
- Failure of forceful explosive cough
- Timbre** → The distinctive quality of the tone produced by a musical instrument (or) voice, as opposed to pitch and loudness

407. (c) Arch of Aorta

(Ref : BDC 4th/e , Vol III, Pg 173)

Origin :-

- ◆ On the right side it is branch of the brachiocephalic artery. It arises posterior to the sternoclavicular joint
- ◆ On the left side it is a branch of the arch of aorta. It ascends and enters the neck posterior to the left sternoclavicular joint.

408. (a) Superior ganglion

(Ref : BDC 4th/e, Vol III, Pg 189)

Theoretically there should be eight sympathetic ganglia corresponding to the eight cervical nerves, but due to fusion there are only three ganglia, superior, middle and inferior

The superior cervical ganglion is the largest of the three ganglia. It is spindle shaped and about 2.5cm long, just below the skull, opposite the 2nd and 3rd cervical vertebra behind the carotid sheath and in front of the prevertebral fascia (longus capitis)

- ◆ Formed by fusion of upper 4 cervical ganglia

409. (c) Upper 2nd molar teeth

(Ref : BDC 4th/e, Vol III, Pg 137)

Parotid duct :-

- ◆ It is also called stenson's duct
- ◆ The duct runs forwards for a short distance between the buccinator and the oral mucosa and opens into the vestibule of the mouth (gingivo.buccal vestibule) opposite the crown of the upper second molar tooth

(Gray's Anatomy 39th/e pg 1556 - Eponyms)

Stenson's duct - the parotid duct

Niels stensen (1638- 1686), Demonstrated the parotid duct at the age of 23.

410. (c) External laryngeal nerve

(Ref : BDC 4th/e, Vol III, Pg 244)

All the intrinsic muscles of the larynx are supplied by the recurrent laryngeal nerve except for the cricothyroid which is supplied by the external laryngeal nerve.

411. (d) Sigmoid sinus & Straight sinus

(Ref : BDC, 4th/e Vol III, Pg 94-95)

Tributaries of incoming channels :-

- (A) From the orbit : - Superior ophthalmic vein
 - A branch of inferior ophthalmic vein or sometimes the vein itself
 - The central vein of retina
- ↓ ↓
- Superior ophthalmic vein Cavernous sinus
- (B) From the brain: - Superficial middle cerebral vein
 - Inferior cerebral veins from the temporal lobe
- (C) From the meninges - Sphenoparietal sinus
 - The frontal trunk of middle meningeal vein may drain into cavernous sinus

Draining channels / Communications :-

- (a) Cavernous sinus (C.S) → Superior petrosal sinus



Transverse sinus

- (b) C.S. → Inferior petrosal sinus → plexus around the internal carotid artery → Internal jugular vein
- (c) C.S. → Pterygoid plexus of veins
- (d) C.S. → Superior ophthalmic vein → facial vein
- (e) C.S on left → C.S. on the right, through anterior & posterior sinuses and basilar plexus of veins

All these communications are valveless, blood flows in either direction.

412. (a) Facial artery

(Ref : BDC, 4th/e, Vol III, Pg 218)

Arterial supply of tonsil :-

- (1) Main source : Tonsillar branch of facial artery
- (2) Additional sources :
 - (a) Ascending palatine branch of facial artery
 - (b) Dorsal lingual branches of lingual artery
 - (c) Ascending pharyngeal branch of the external carotid artery
 - (d) The greater palatine branch of the maxillary artery

413. (a) Upper border of thyroid cartilage

(Ref: BDC 4th/e Vol III, Pg 127, 177)

- ◆ The common carotid artery lies in front of the lower four cervical transverse processes
- ◆ At the level of the upper border of the thyroid cartilage the artery ends by dividing into the external and internal carotid arteries

- ◆ The common carotid artery can be compressed against the carotid tubercle i.e. the anterior tubercle of the transverse process of vertebra C6 which lies at the level of the cricoid cartilage

414. (c) Passes through foramen ovale

(Ref : BDC 4th/e Vol III, Pg 152, 153, Pg 237 for 'd')

Mandibular nerve :

- ◆ Largest branch of trigeminal nerve
- ◆ It has both sensory and motor fibres
- ◆ Mandibular nerve begins in the middle cranial fossa through a large sensory and a small motor root. The sensory root arises from the lateral part of the trigeminal ganglion, and leaves the cranial cavity through the foramen ovale
- ◆ The branches of the sphenopalatine ganglion are actually branches of the maxillary nerve

415. (a) Abduction

(b) Intorsion

(d) Depression

(Ref : BDC 4th/e Vol III, Pg 109)

Action of muscles in primary position :

- (1) Superior oblique → Depression + Abduction + Intorsion
- (2) Inferior oblique → Elevation + Abduction + Extorsion
- (3) Inferior rectus → Depression + Abduction + Extorsion
- (4) Superior rectus → Elevation + Adduction + Intorsion
- (5) Medial rectus → Only adduction
- (6) Lateral rectus → Only abduction

For the nerve supply remember S04 LR 6

i.e. Superior oblique - 4th cranial nerve

Lateral rectus - 6th cranial nerve

Rest all extra ocular muscles are supplied by oculomotor nerve

416. (b) Traverses through parotid gland

(Ref : BDC, 4th/e Vol III, Pg 138 - 139)

- ◆ The two roots of the facial nerve are attached to the lateral part of the lower border of the pons just medial to the eighth cranial nerve
- ◆ Within the facial canal it gives the branch of chorda tympani which carries taste sensations from the anterior 2/3rds of the tongue
- ◆ The medial and lateral pterygoids, the masseter and temporalis are all supplied by mandibular nerve (muscles of mastication)
- ◆ The facial nerve enters the posteromedial surface of the parotid gland, runs forwards through the gland crossing the retromandibular vein and external carotid artery

417. (b) Vertebral artery

(d) XI cranial nerve

(Ref : BDC, Vol III, Pg 18)

The foramen magnum transmits :-

'The lowest part of medulla oblongata and not the spinal cord' so don't be a stickler and accept it !!!

Also transmits :-

- ◆ Three meninges

Through subarachnoid space :-

- ◆ XI cranial nerve
- ◆ Vertebral arteries and sympathetic plexus around it
- ◆ Posterior spinal arteries
- ◆ Anterior spinal arteries

Through the narrow anterior part :-

- ◆ Apical ligament of dens
- ◆ Vertical band of cruciate ligament
- ◆ Membrana tectoria

418. (a) Lower end of cricoid

(Ref : BDC 4th/e, Vol I Pg 195)

- ◆ The oesophagus is a downward continuation of the pharynx and begins at the lower border of the cricoid cartilage opposite the lower border of the body of vertebra C6

Note : The no.s 15- 25- 40 are important to an oesophagoscopist because these represent the distance in cm from the incisor teeth of the constrictions due to cricopharynx, arch of aorta, and gastroesophageal junction

The precise measurements - Pg 268 :-

- ◆ At its beginning 15cm from incisor teeth
- ◆ Aortic arch - 22.5cm
- ◆ Left bronchus - 27.5cm
- ◆ 37.5cm due to it piercing the diaphragm

419. (a) Round ligament

(Ref : BDC 4th/e Vol II, Pg 208)

Structures passing through the canal :-

- (1) The spermatic cord in males, or the round ligament of uterus in females, enter the inguinal canal through the deep inguinal ring and passes out through the superficial inguinal ring.

Constituents of spermatic cord : (Very Important)

- (1) The ductus deferens
- (2) Testicular and cremasteric arteries and artery of ductus deferens

- (3) The pampiniform plexus of veins
- (4) Lymph vessels from the testis
- (5) The genital branch of genitofemoral nerve and plexus of sympathetic nerves around the artery of ductus deferens
- (6) Remains of processus vaginalis

420. (a) Internal iliac

(Ref: BDC 4th/e, Vol II, Pg 387)

Internal iliac artery

Anterior division

Posterior division

Male - 6

- Superior vesical
 - Obturator
 - Middle rectal
 - Inferior vesical
 - Inferior gluteal
 - Internal pudendal
- (Last 2 are terminal)
- Iliolumbar
 - 2 lateral sacral
 - Superior gluteal arteries

Female - 7

- Inferior vesical replaced by vaginal artery
- The uterine artery is the 7th branch

421. (b) Superior mesenteric artery

(Ref: BDC 4th/e Vol II, Pg 252)

The jejunum and ileum are supplied by branches of the superior mesenteric artery and are drained by corresponding veins

422. (a) C3-4

(Ref: BDC, 4th/e Vol II, Pg 312)

Shoulder tip pain :-

Irritation of the diaphragm may cause referred pain in the shoulder because the phrenic and supra clavicular nerves have the same root values (C3,C4,C5)

423. (c) Aponeurosis

(Ref: BDC, 4th/e Vol II, Pg 201)

- ◆ The aponeurosis of the three flat muscle seem to end in the fibrous raphe - the linea alba.
- ◆ Each aponeurosis is made up of the two laminae. The laminae of the two sides interdigitate in a manner that the superficial lamina

of one gets continuous with deep lamina of the opposite side and vice versa

- ◆ This provides enough strength to the anterior abdominal wall
- ◆ Now consider 75% of strength of intact abdominal wall and look at the other options given and also the fact that obesity contributes to laxity of anterior abdominal wall due to subcutaneous fat collection, and that herniation of abdominal contents is neither prevented by skin, subcutaneous fat nor peritoneum.

424. (b) Tunica albuginea

(Ref : BDC, 4th/e vol II Pg, 220, 219, 217 fig (17.4))

- ◆ Hydrocele is a condition in which fluid accumulates in the processus vaginalis i.e. between the two layers of Tunica vaginalis
- ◆ The tunica albuginea is a dense, white fibrous coat covering the testis all around. It is covered by the visceral layer of Tunica vaginalis, except posteriorly where the testicular vessels and nerves enter the gland (Pg 217)
- ◆ Since the fluid needs to be aspirated from between the two layers of tunica vaginalis, it is not needed for the needle to go any further and pierce tunica albuginea

Layers of scrotum : - (Pg 216)

- (1) Skin
- (2) Dartos muscle - replaces superficial fascia
- (3) External spermatic fascia
- (4) Cremasteric fascia
- (5) The internal spermatic fascia

425. (a) Inferior vesical

(d) Internal pudendal

(Ref : BDC, 4th/e Vol II, Pg 373)

- ◆ The prostate is supplied by branches from the inferior vesical, middle rectal and internal pudendal arteries
- ◆ Branches of these arteries form a large outer or subcapsular plexus, and a small inner or periurethral plexus
- ◆ The greater part of the gland is supplied by the subcapsular plexus

426. (b) Is situated anterior to the portal vein

(d) Is separated from the inferior vena cava by the epiploic foramen

(Ref : BDC, 4th/e Vol II, Pg 275 & 232)

Relations of the Bile duct :-

(A) Supraduodenal part (free margin of lesser omentum)

- (1) Anteriorly : Liver
- (2) Posteriorly : Portal vein and epiploic foramen
- (3) To the left : Hepatic artery

(B) Retrooduodenal part

- (1) Anteriorly : 1st part of duodenum
- (2) Posteriorly : Inferior vena cava
- (3) To the left : Gastroduodenal artery

(C) Infraduodenal part :-

- (1) Anteriorly : a groove in the upper and lateral parts of the posterior surface of the head of the pancreas
- (2) Posteriorly : Inferior vena cava

(D) Intraduodenal part

- ◆ The epiploic foramen has free margin of lesser omentum anteriorly and inferior vena cava posteriorly.
- ◆ Near the middle of the left side of the second part of the duodenum, the intraduodenal part.
- ◆ The bile duct runs downwards and backwards, first in the free margin of the lesser omentum, supra duodenal part and then behind the first part of the duodenum the retrooduodenal part

427. (a) The fibres of external and internal oblique muscle are oriented perpendicular to one another

(c) The muscles are innervated partially by lower intercostal nerves

(Ref : BDC 4th/e Vol II, Pg 198, 201)

External oblique muscles :-

The muscle arises by eight fleshy slips from the middle of the shaft of the lower eight ribs. The fibres run downwards forwards and medially

Internal oblique muscle :-

The fibres run upwards, forwards and medially crossing the fibres of the external oblique muscle at right angles

Nerve supply :-

- | | |
|---------------------------|---|
| (1) External oblique | → Lower six thoracic nerves |
| (2) Internal oblique | → Lower 6 thoracic & 1 st lumbar nerve |
| (3) Transversus abdominis | → Lower 6 thoracic & 1 st lumbar nerve |
| (4) Rectus abdominis | → Lower 6 (or) 7 thoracic nerves |

- ◆ Flexion of the trunk (or) lumbar spine is brought about mainly by the rectus abdominis
- ◆ The contraction of these muscles increase intra-abdominal pressure

i.e. in Forceful expulsive acts :-

- Micturition
- Defecation

- Parturition
- Vomiting etc.
- in **Forceful expiratory acts**
- Coughing
- Sneezing
- Blowing
- Shouting etc.

428. (a) Its fundus is normally situated on the transpyloric line at the tip of the ninth costal cartilage

(b) It occupies a groove that separates the right and quadrate lobes of the liver

(c) It is related posteriorly to the first part of the duodenum

(Ref : BDC, 4th/e, Vol II, 274 for 'a' and 'c', 276 for 'd', 251 for 'c')

- ◆ The fundus projects beyond the inferior border of the liver, in the angle between the lateral border of the right rectus abdominis and the ninth costal cartilage
- ◆ The transpyloric plane is an imaginary transverse plane often referred to in anatomical description, anteriorly it passes through the tips of ninth costal cartilage and posteriorly through the lower part of the body of the first lumbar vertebra
- ◆ The body of the gall bladder is related to the beginning of the transverse colon and to the first and second parts of the duodenum
- ◆ The cystic artery is the chief source of the blood supply and is distributed to the gall bladder, the cystic duct, the hepatic ducts and the upper part of bile duct. It is a branch of right hepatic artery
- ◆ For 'b' see fig 22.4 where the gall bladder separates the right lobe of liver from quadrate lobe

429. (c) Admit spinal arteries

(Ref : Gray's Anatomy 39th/e pg 735, 742)

- ◆ The oval intervertebral foramina, behind the bodies and between the pedicles are smallest at the cervical and upper thoracic levels, and increase progressively in the thoracic and upper lumbar regions

The lumbo sacral (L5/S1) intervertebral foramen is the smallest of the lumbar foramina..so option (a) could be right but (c) is the best response since

- ◆ A foramen contains :-
- segmental mixed spinal nerves and its sheath
- from 2 to 4 recurrent meningeal (sinuvertebral nerves)
- variable number of spinal arteries
- plexiform venous connections between external & internal vertebral venous plexuses

430. (b) Has an anterior lobe which hypertrophies in old age

(Ref : BDC 4th/e Vol II, Pg 372)

- ◆ Pg 371- Prostate lies in lesser pelvis, below the neck of the urinary bladder, behind lower part of the pubic symphysis and the upper part of the pubic arch and in front of the ampulla of the rectum
- ◆ There is no glandular tissue in the anterior lobe of the prostate and seldom forms an adenoma
- ◆ Adenoma never occurs in posterior lobe but primary carcinoma is said to begin in this part
- ◆ The median lobe lies behind the upper part of urethra, in front of the ejaculatory ducts just below neck of the bladder

431. (a) T 12 & L1

(Ref : BDC, 4th/e Vol II, Pg 262, 261)

The coeliac trunk arises from the front of the abdominal aorta just below the aortic opening of the diaphragm at the level of the disc between vertebrae thoracic twelve and first lumbar

Superior mesenteric artery → L1 (1cm below coeliac trunk)

Inferior mesenteric artery → L3 (3-4cm above bifurcation of aorta)

432. (d) All of the above

(Ref : BDC, 4th/e Vol II, Pg 360)

The broad ligament contains the following structures :-

- (1) The uterine tube
- (2) The round ligament of the uterus
- (3) The ligament of the ovary
- (4) Uterine vessels near its attachment to the uterus
- (5) Ovarian vessels in the infundibulopelvic ligament
- (6) The uterovaginal and ovarian nerve plexuses
- (7) Epoophoron
- (8) Paraoophoron
- (9) Some lymph nodes and lymph vessels
- (10) Dense connective tissue or parametrium present on the sides of the uterus

433. (a) L4, L5, S1

(Ref : BDC, 4th/e Vol II, Pg 383)

Above the pectinate line :-

Sympathetic → Inferior hypogastric plexus - L1, L2

Parasympathetic → Pelvic splanchnic - S2, S3, S4

Pain is carried by both

Below the pectinate line :-

Somatic → Inferior rectal - S2, S3, S4 nerves

34. (a) Left renal vein

(Ref : BDC, 4th/e Vol II, Pg 218)

Testis:-

On the right side → Inferior vena cava

On the left side → Left renal vein

Ovary :- (355)

On the right side → Inferior vena cava

On the left side → Left renal vein

435. (a) They laterally flex and rotate the vertebral column**(c) They support and protect the abdominal viscera****(d) They assist in increasing the intra-abdominal pressure during micturition and defecation**

(Ref : BDC, 4th/e Vol. II, Pg 201)

◆ **Movement of the trunk :-**

(a) Flexion of the trunk (or) lumbar spine is brought about mainly by the rectus abdominus

(b) Lateral flexion of the trunk is done by one sided contraction of the oblique muscles

(c) Rotation of the trunk is produced by the combined action of the external oblique with opposite internal oblique

◆ **Support for abdominal viscera :-**

The abdominal muscles provide a firm but elastic support for the abdominal viscera against gravity. The chief muscles are oblique muscles, and mainly internal oblique.

◆ The oblique muscles, assisted by the transversus, can compress the abdominal viscera and thus help in all expulsive acts, like micturition, defecation, parturition, vomiting etc

Note :-

◆ The diaphragm is the main muscle of inspiration it is assisted by muscles of the chest wall, by making the chest wall rigid so that the compliance and the vital capacity of lungs is not decreased

◆ Abdominal muscles are responsible for forced expiratory acts

436. (b) 3.75cm

(Ref : BDC, 4th/e Vol II, Pg 208)

The question should have been more specific since there is a discrepancy in the answer, depending on whether they want the actual length (or) the surface marking

Since after defining Inguinal canal B.D.C. gives the length of about 4cm (1.5 inches) long and the direction being downwards, forwards and medially.

Surface marking :-

It is marked by two parallel lines 1cm apart and about 3.7cm long above the medial half of the inguinal ligament.

Since (b) matches one of them we choose it !!

437. (c) Left gastric

(Ref : BDC, 4th/e Vol II, Pg 263)

(1) The left gastric artery is the smallest of the three branches of the coeliac trunk

The other 2 branches are :-

(2) Common hepatic artery

(3) Splenic artery

438. (a) Inguinal triangle

(Ref : BDC 4th/e Vol II, Pg 210)

Direct inguinal hernia :-

A direct hernia passes through Hasselbach's triangle which is bounded medially by the lateral border of the rectus abdominus, laterally by the inferior epigastric artery, and below by the inguinal ligament. The triangle is divided into medial and lateral parts of the triangle and are referred to as direct medial and lateral hernias.

439. (a) Ilioinguinal nerve

(d) Inferior epigastric artery

(Ref : BDC, 4th/e, Vol II, Pg 208, 209)

◆ The structure passing through the canal (Internal ring also)
Males - spermatic cord

Females - round ligaments of uterus

◆ The ilioinguinal nerve does not pass through the internal ring (deep), it enters the canal through the interval between the external and internal oblique muscles and passes out through superficial inguinal ring

◆ Vas deferens and pampiniform plexus are contents of the spermatic cord

440. (d) Uterus and rectum

(Ref : BDC, 4th/e vol II Pg 234)

Rectouterine pouch : - (Pouch of Douglas)

◆ Most dependant part of the peritoneal cavity in the upright position
◆ In supine position - most dependant part of the pelvic cavity

Boundaries :-

Anteriorly - uterus and posterior fornix of vagina

Posteriorly - Rectum

Inferior - Recto vaginal fold of peritoneum

441. (b) Hepatic artery**(d) Portal vein**

(Ref : BDC, 4th/e Vol II, Pg. 226)

The right free margin of lesser omentum contains :-

- (a) Hepatic artery (proper)
 - (b) The portal vein
 - (c) The bile duct
 - (d) Lymph nodes and lymphatics
 - (e) The hepatic plexus of nerves
- ♦ The common hepatic artery after the origin of gastroduodenal artery is called hepatic artery proper

442. (c) Lymph vessels**(d) Ilio inguinal nerve**

(Ref : BDC/ 4th/e Vol II, Pg 206)

Contents :-

- (1) Muscle → Rectus abdominis
Pyramidalis
- (2) Arteries → Superior epigastric artery
Inferior epigastric artery
- (3) Veins → Superior epigastric vein
Inferior epigastric vein
- (4) Nerves → Terminal parts of the lower 6 thoracic nerves including the lower 5 intercostal nerves and the subcostal nerves

443. (d) Supplies the jejunum, appendix and ascending and transverse portions of the colon

(Ref : BDC, 4th/e Vol II, Pg 264)

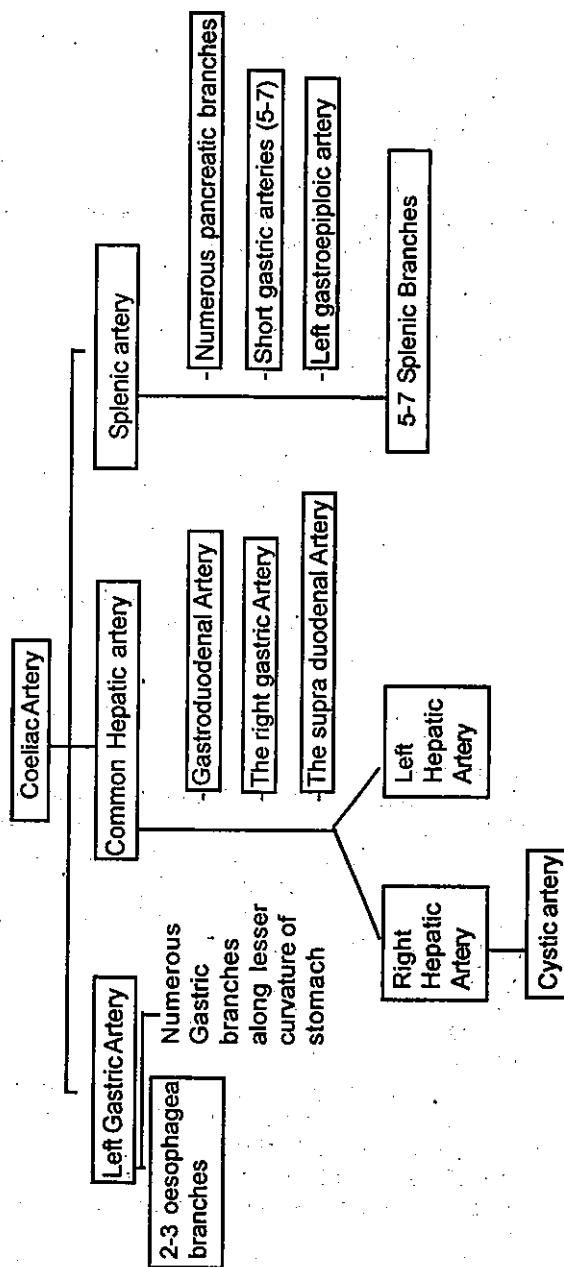
- ♦ The superior mesenteric artery arises from the front of the abdominal aorta, behind the body of pancreas at the level of vertebra L1, 1cm below the coeliac trunk
- ♦ It supplies all derivatives of the midgut :-

- (1) Lower part of duodenum below the opening of the bile duct
- (2) The jejunum
- (3) The ileum
- (4) The appendix
- (5) The caecum
- (6) The ascending colon
- (7) The right two thirds of the transverse colon
- (8) The lower half of the head of the pancreas

- ♦ At its origin it lies first behind the body of the pancreas and then in front of the uncinate process. Next, it crosses the third part of the duodenum, enters the root of mesentery and runs between its two layers.

444. (c) Splenic artery

(Ref : BDC, 4th/e Vol II, Pg 263, 264)



445. (c) Mucus membrane has folds

(Ref : BDC, 4th/e, Vol II, Pg 347)

- ◆ Empty bladder → Greater part of mucosa shows irregular folds → loose attachment to the muscular coat
- ◆ Small triangular area over the lower part of the base of bladder - mucosa is smooth due to its firm attachment to the muscular coat. This area is known as the trigone of the bladder
- ◆ The base of the trigone is formed by the **interureteric ridge** (or) **bar of Mercier** produced by continuation of the inner longitudinal muscle coats of the ureters
- ◆ A slight elevation on the trigone immediately posterior to the urethral orifice produced by the median lobe of the prostate; is called the **uvula vesicae**
- ◆ Trigone of the bladder is formed by the absorption of the mesonephric ducts and is mesodermal in origin

446. (b) Greater omentum

(Ref : BDC, 4th/e Vol II pg 226)

Functions of greater omentum :-

- (1) Store house of fat
- (2) Protects the peritoneal cavity against infection because of presence of macrophages in it, collections of which form dense, small patches → milky spots visible to naked eye
- (3) Limits the spread of infection and sealing it off from surrounding areas

On this account, the greater omentum is also known as the policeman of abdomen

447. (d) It is innervated by the lower 6 intercostal nerves

(Ref : BDC, 4th/e Vol II, Pg 200)

Rectus abdominis :-Origin :2 tendinous heads

- ◆ Lateral head from lateral part of pubic crest
- ◆ Medial head from anterior pubic ligament

Insertion

- ◆ On the front of the wall of the thorax along a horizontal line passing laterally from the xiphoid process, and cutting in that order, the 7th, 6th and 5th costal cartilage

Nerve supply :-

Lower six (or) seven thoracic nerves

448. (d) Obturator internus muscle

(Ref : BDC, 4th/e Vol II Pg 326)

10 Muscles of the perineum converge and interlace in the perineal body :-

- ♦ 2 unpaired - External anal sphincter (2)
The unstripped fibres of the longitudinal muscle coat of rectal ampulla & anal canal
- ♦ 4 paired - Bulbospongiosus (4x 2 = 8)
Superficial transverse perinei
Deep transversus perinei
Levator ani (8+2 = 10)

449. (a) Anterior to genito femoral nerve

(c) Anterior to Internal iliac artery

(Ref : BDC, 4th/e Vol II, Pg 302)

Posterior relations of ureter :-

- (1) Psoas major
- (2) Tips of transverse processes
- (3) The genitofemoral nerve

Abdomen

- (1) Internal iliac artery

- (2) Commencement of ant. trunk of int. iliac A.

- (3) Internal iliac vein

- (4) Lumbosacral trunk

- (5) Sacroiliac joint

Pelvic

Anterior relations :-

- ♦ The gonadal vessels are anterior to both ureters

- ♦ The root of mesentery is anterior to the right abdominal ureter.

450. (a) Ascending colon

(Ref : B.D.C 4th/e Vol II, Pg 266)

Supplies the derivatives of the hindgut & post. part of cloaca :-

- (1) Left one third of transverse colon
- (2) The descending colon
- (3) The sigmoid colon
- (4) The rectum
- (5) The upper part of anal canal, above the anal valves

451. (a) Branches of the renal artery

(b) Renal pelvis

(c) Sympathetic nerve fibres

(d) Tributaries of the renal vein

(Ref : BDC, 4th/e Vol II, Pg 296)

The following structures are seen in the hilum from anterior to posterior side :-

- (1) The renal vein

- (2) The renal artery

- (3) The renal pelvis

- ◆ Commonly one of the branches of the renal artery enters the hilus behind the renal pelvis, and a tributary of the renal vein may be found in the same plane
(Gray's 39th/e Pg 1277)
- ◆ A dense plexus of autonomic nerves around the renal artery is formed by rami from the coeliac ganglion and plexus, aorticorenal ganglion, lowest thoracic splanchnic nerve, first lumbar splanchnic nerve and aortic plexus
- ◆ Small ganglia occur in the renal plexus, the largest usually behind the origin of the renal artery
- ◆ The plexus continues around the arterial branches to supply the vessels, renal glomeruli, and tubules, especially the cortical tubules

452. (b) Deficient anterosuperiorly

(Ref : BDC, 4th/e Vol II pg 205, 206)

- ◆ Rectus sheath is complete anteriorly covering the muscle from end to end
- ◆ Posterior wall is incomplete, being deficient above the costal margin and below the arcuate line
 - above → the rectus muscle directly rests on 5th, 6th and 7th costal cartilages
 - below → Midway between the umbilicus and pubic symphysis, the posterior wall of the rectus sheath ends in the arcuate line as linea semicircularis (or) fold of Douglas.
- ◆ Below the costal margin and above the arcuate line posterior wall is contributed by the post. lamina of the internal oblique and aponeurosis of transversus abdominis
- ◆ Besides rectus abdomini, pyramidalis is also the muscular content of the rectus sheath
- ◆ The inferior epigastric artery enters the sheath by passing in front of the arcuate line

453. (c) First lumbar

(Ref : BDC, 4th/e Vol II, Pg 316)

- ◆ The left renal vein crosses in front of the aorta, and lies behind the pancreas and the splenic vein. It receives the left suprarenal and gonadal veins.

(Gray's Anatomy, 39th/e Pg 1276)

The left renal vein

- ◆ The left gonadal vein enters it from below and the left suprarenal vein, usually receiving one of the left inferior phrenic veins, enters it above but nearer the midline

454. (a) Internal iliac artery

(Ref : BDC, 4th/e Vol II, Pg 387)

Internal pudendal artery is always a branch of internal iliac artery, irrespective of sex.

Only difference is

- ◆ Male has 6 branches of Int. Iliac
- ◆ Female has 7 branches of Int. Iliac (Uterine artery being the 7th)
and

Inferior vesical artery in males being replaced by the vaginal artery in females

455. (d) Right supra renal gland

(Ref : BDC, 4th/e Vol II, Pg 221 - 'a' & 'b', 274 'c' 305 'd')

- ◆ Transpyloric plane of addison passes midway between the supra sternal notch and the pubic symphysis. It lies roughly a hand's breadth below the xiphisternal joint
- ◆ Anteriorly it passes through the tips of ninth costal cartilage and posteriorly through the body of vertebra L1 near its lower border
- ◆ The fundus of the gall bladder projects the inferior border of the liver, in the angle between the lateral border of the right rectus abdominis and the ninth costal cartilage
- ◆ The supra renal glands :-

Each gland lies in the epigastrium, at the upper pole of the kidney, in front of the crus of the diaphragm, opposite the vertebral end of the 11th intercostal space and the 12th rib.

456. (d) 34 weeks

(Ref : BDC, 4th/e Vol II, Pg 21- 22)

The femur ossifies from :-

- | | |
|-------------|--|
| 1 primary | - Shaft - appears at 7 th week of I. U. life. |
| 4 secondary | - Lower end - end of ninth month of I.U. life (36 weeks) |
| | - Head - 1 st 6 months of I.U. life |
| | - Greater trochanter - 4 th year |
| | - Lesser trochanter - 12 th year |

457. (b) Midtarsal joint

(Ref : Maheshwari, 3rd/e pg 194)

In this section of the book, the various terms used with the description of C.T.E.V are explained including

Varus : The foot is inverted and adducted at the mid-tarsal joints so that the sole 'faces' inwards

• Valgus : The foot is everted and abducted at the midtarsal joints so that the sole faces outwards.

458. (d) Long saphenous vein

(Ref : Gray's Anatomy, 39th/e pg 1452)

The long saphenous vein (great saphenous vein), the longest vein in the body, starts distally as a continuation of the medial marginal vein of the foot, and ends in the femoral vein a short distance distal to the inguinal ligaments.

459. (c) 4

(Ref : *Gray's Anatomy, 39th/e pg 1453*)

Long saphenous vein :-

- ◆ It connects with posterior tibial venae committantes by a series of perforating (communicating) veins. There are usually three, equally spaced between the medial malleolus and the midcalf
- ◆ More than three such perforators are uncommon, and an arch vein perforator above mid calf is only very rarely found
- ◆ Above the posterior crural arch vein, perforating veins join the long saphenous vein or one of its main tributaries at two main sites. The first is at a level in the upper calf indicated by its name, the tibial tubercle perforator (4th) the second is in the lower / intermediate 3rd of thigh.

460. (b) Ant. superior iliac spine

(Ref : *BDC, 4th/e Vol II, Pg 59*)

Origin

- (1) Sartorius - Ant. superior iliac spine
- Upper half of the notch below the spine

Insertion

- Upper part of the medial surface of the shaft of gracilis the tibia in front of the insertions of the and the semitendinosus

- ◆ All muscles of the anterior compartment of thigh are supplied by the femoral nerve (L2,L3 and L4)

◆ Action :-

The sartorius is an abductor and lateral rotator of the thigh and flexor of the leg. All these actions are involved in assuming the position in which tailors sit and work.

461. (b) At the hiatus in adductor magnus

(Ref : *BDC, 4th/e Vol II, Pg 83*)

- ◆ The popliteal artery is the continuation of the femoral artery
- ◆ It begins at the opening in the adductor magnus or hiatus magnus, i.e. at the junction of the middle one-third with lower one third of the thigh
- ◆ It runs downwards and slightly laterally to reach the lower border of the popliteus, where it terminates by dividing into the anterior and posterior tibial arteries

462. (d) Adductor brevis

(Ref : BDC, 4th/e Vol II, Pg 51)

The floor of the femoral triangle is formed

Medially by [Adductor longus

Pectenue

& laterally by [Iliacus

Psoas major

Femoral triangle :-

Laterally by - medial border of sartorius

Medially by - medial border of adductor longus

Base by - inguinal ligament

Roof :-

(1) Skin

(2) Superficial fascia

Nodes (Superficial inguinal)
 Femoral branch of genitofemoral nerve
 Branches of ilioinguinal nerve
 Superficial branches of femoral artery
 with acc. veins & upper part of great
 saphenous vein

(3) Deep fascia

Saphenous opening
 Cribiform fascia

463. (b) Knee joint

(Ref : BDC, 4th/e Vol II, Pg 142, 143, 148)

The hip joint is supplied by :

- (1) Femoral nerve, through nerve to rectus femoris
- (2) The anterior division of the obturator nerve
- (3) The accessory obturator nerve
- (4) The nerve to the quadratus femoris
- (5) The superior gluteal nerve

The knee joint is supplied by :

- (1) The femoral nerve, through its branches to the vasti, especially the vastus medialis
- (2) Sciatic nerve, through genicular branches of the tibial and common peroneal nerves

Pg 143 (See pt E)

Disease of the hip like tuberculosis, may cause referred pain in the knee because of the common nerve supply of the two joints.

464. (b) Femoral triangle

(Ref : BDC, 4th/e Vol II, Pg 50)

Pg 50. - The medial margin of the saphenous opening lies at a deeper level. It is formed by the fascia overlying the pectenue. The

fascia passes behind the femoral sheath. The saphenous opening is closed by cribriform fascia which covers the opening

Pg 51 - Roof of the femoral triangle is formed by skin, superficial fascia and deep fascia - with saphenous opening and the cribriform fascia

465. (b) Floor

(Ref : BDC, 4th/e Vol II, Pg 82)

The floor of the popliteal fossa is formed from

Above downwards by :-

- (1) Popliteal surface of the femur
- (2) The capsule of the knee joint and the oblique popliteal ligament
- (3) The strong popliteal fascia covering the popliteal muscle

466. (c) Posterior tibial artery

(Ref : BDC, 4th/e Vol II, Pg 117)

- ♦ Peroneal artery is the largest branch of the posterior tibial artery
- ♦ It supplies the posterior and lateral compartments of the leg

467. (a) Right main bronchus

(Ref : BDC, 4th/e Vol I, Pg 228)

- ♦ Trachea divides at lower border of T4 vertebra
- ♦ The right principal bronchus is 2.5cm long
- ♦ It is shorter, wider and more in line with the trachea than the left principal bronchus
- ♦ Inhaled particles, therefore, tend to pass more frequently to the right lung; with the result that infections are more common on the right side

468. (c) 14 to 15 cm

(Ref : BDC, 4th/e Vol II, Pg 265)

- ♦ The trachea is 10 to 15cm in length (10-11cm according to Gray's 39th/e pg 1075)
- ♦ External diameter in males - 2 cm; females - 1.5 cm
- ♦ Lumen smaller in living than in cadaver and
 - 3mm at the age of 1year
 - corresponds to age in years during childhood
 - with a maximum of 12mm in adults
- ♦ Upper end of trachea - Lower border of cricoid cartilage opp. C6 vertebra
- ♦ In living subjects - erect posture - bifurcation of trachea (carina) lies at T6 vertebra and descends still further in inspiration (Though Gray's 39th/e pg 1088, 1075 gives its level as T3-4 or T4)

469. (d) Left coronary

(Ref : BDC, 4th/e Vol I, Pg 250)

Branches of left coronary artery :-

- | | |
|----------------|--|
| Large branches | - Anterior interventricular
- Branches to the diaphragmatic surface of the left ventricle including a large diagonal branch |
| Small branches | - Left atrial
- Pulmonary
- Terminal |

Supply :

- (1) Left atrium
- (2) Ventricles
 - (Most) Greater part of left ventricle except the area adjoining the posterior interventricular groove
 - Small part of right ventricle adjoining anterior interventricular groove
- (3) Anterior part of interventricular septum
- (4) A part of the left branch of the AV bundle

470. (a) Superior epigastric

(c) Musculophrenic

(Ref : BDC, 4th/e Vol I, Pg 212)

- ◆ The internal mammary artery terminates in the sixth intercostal space by dividing into the superior epigastric and musculo phrenic arteries
- ◆ Internal thoracic artery (mammary) arises from the inferior aspect of the first part of the subclavian artery opposite the thyrocervical trunk. The origin lies 2cm above the sternal end of the clavicle

471. None. The correct answer is T5 vertebra

(Ref : BDC, 4th/e Vol I, Pg 270)

- ◆ Largest lymphatic vessel in the body - thoracic duct
- ◆ 45cm long
- ◆ Beaded due to many valves
- ◆ Begins as a continuation of cisterna chyli near the lower border of T12 and enters thorax through the aortic opening of the diaphragm
- ◆ It then ascends through the posterior mediastinum crossing from the right side to the left at the level of the T5 vertebra
- ◆ Arches laterally in the neck at level of C7 vertebra and ends by opening into the angle of junction between the left subclavian and left internal jugular veins

472. (c) Independent pulmonary vein

(Ref : BDC, 4th/e Vol I, Pg 229)

- ◆ 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

473. (b) Medial and lateral

(Ref : BDC, 4th/e Vol I, Pg 229)

Right lung - Bronchopulmonary segments

<u>Lobes</u>	<u>Left lung Lobes :-</u>		
- Upper	Apical	Upper division	Apical
	Posterior		Posterior
	Anterior		Anterior
- Middle	Lateral	Lower division	Superior lingular
	Medial		Inferior lingular
- Lower	Superior	Lower	Superior
	Anterior basal		Anterior basal
	Medial basal		Medial basal
	Lateral basal		Lateral basal
	Posterior basal		Posterior basal

474. (a) Apical segment of rt. lower lobe

(Ref : BDC, 4th/e Vol I, Pg 231)

Knowledge of the detailed anatomy of the bronchial tree helps considerably in :-

- (1) Surgical removal of a segment (or) segmental resection.
- (2) Drainage of lung abscess (or) bronchiectasis by making the patient adopt a particular posture called postural drainage
- (3) Visualizing the interior of the bronchi through an instrument passed through the mouth and trachea. The instrument is called a bronchoscope and the procedure is called bronchoscopy
- (4) In understanding why abscesses are more common in some segments like the posterior segment of the right upper lobe, and the apical segment of the right lower lobe.

475. (b) Recurrent laryngeal nerve

(Ref : BDC, 4th/e Vol I, Pg 266)

Nerve supply of trachea:-

(1) Parasympathetic :-

- Nerve through vagi and recurrent laryngeal nerves
- It is sensory and secretomotor to the mucous membrane and motor to the trachialis muscle

(2) Sympathetic :-

Fibres from middle cervical ganglion reach it along the inferior thyroid arteries and are vasomotor

476. (b) Lower apical

(Ref : BDC, 4th/e Vol I, Pg 231)

Abscess are more common in some segments like

- Posterior segment of right upper lobe and
- Apical segment of the right lower lobe

(Gray's Anatomy 39th/e pg 1076)

Consider the following information in the view that the supine position is kept in mind:

- ◆ The right inferior lobar bronchus is the continuation of the principal bronchus beyond the origin of the middle lobar bronchus.
(We all known that the right principal bronchus is more 'in line' with the trachea and the left principal bronchus is more oblique to the trachea)
- ◆ The right inferior lobar bronchus a little below its origin from the principal bronchus gives off a large superior (apical) segmental bronchus posteriorly, which runs posteriorly to divide into medial, superior and lateral branches.

Thus it is the most dependant segment in the supine position

477. (c) Dendritic tree

(Ref : Gray's Anatomy, 39th/e Pg 269)

Neonatal brain :-

The growth can be accounted partly by increase in the size of nerve cell somata, the profusion and dimensions of their dendritic trees, axons and their collaterals and by growth of the neuroglial cells and cerebral blood vessels, but it mainly reflects the acquisition of myelin sheaths by the axons.

(If the option had myelination that would have been the answer, but dendritic tree seems to be the best option)

478. (b) Lower brachial

(Ref : BDC, 4th/e Vol I, Pg 170)

- ◆ Damage to the C8 and T1 segments is called Klumpke's paralysis
- ◆ Small intrinsic muscles of the hand are affected
- ◆ Leads to complete claw hand
- ◆ Loss of sensation on medial side of forearm
- ◆ If T1 is injured proximal to the white ramus communicans to first thoracic sympathetic ganglion there is an associated Horner's syndrome.

479. (a) Radial nerve**(b) Median nerve****(c) Ulnar nerve**

(Ref : BDC, 4th/e Vol I, Pg 66)

<u>Region supplied</u>	<u>Nerve (S)</u>
DORSUM OF HAND	
(1) Medial half including proximal phalanges of medial 2 1/2 digits	Dorsal branch of ulnar

(2) Lateral half including proximal phalanges of lateral 2 1/2 digits	Superficial terminal branch of radial
---	---------------------------------------

DIGITS

Palmar aspect, and dorsal aspect of middle and distal phalanges

(1) Lateral 3 1/2 digits	Palmar digital branch of median
(2) Medial 1 1/2 digits	Palmar digital branch of ulnar

480. (b) Radial and musculocutaneous nerve

(Ref : BDC, 4th/e Vol I, Pg 85)

Muscles of front of arm :-

(1) Coracobrachialis - Musculo cutaneous nerve (C5-C7)

(2) Biceps brachii - Musculo cutaneous nerve (C5; C6)

(3) Brachialis - Musculocutaneous nerve is motor

Radial nerve is proprioceptive

481. (a) Radial nerve**(d) Posterior Interosseous nerve**

(Ref : BDC, 4th/e Vol I, Pg 132)

Actions of extensor digitorum :

♦ Extension of interphalangeal, metacarpophalangeal, metacarpophalangeal and wrist joints

Nerve supply - posterior interosseous nerve (C7, C8)

♦ Posterior interosseous nerve is a branch of radial nerve

482. (a) Biceps**(b) Brachialis****(c) Brachioradialis**

(Ref : BDC, 4th/e Vol I, Pg 148)

Flexion of the elbow is brought about by :-

(1) Brachialis

(2) Biceps

(3) Brachio radialis

Teres minor has nothing to do with elbow joint since it does not cross the elbow joint in order to act on it. In fact it is nowhere close to the elbow joint.

483. (c) Radial nerve arises from posterior cord

(Ref : BDC, 4th/e Vol I, Pg 51-53)

The origin of the plexus may shift by one segment either upward (or) downward, resulting in a prefixed (or) a postfixed plexus respectively

- ◆ In a prefixed plexus :-
 - Contribution by C4 is large
 - T2 is often absent
- ◆ In a post fixed plexus :-
 - The contribution by T1 is large
 - T2 is always present
 - C4 is absent
 - C5 is reduced in size
- ◆ Cause of injury to lateral cord is mostly dislocation of humerus - Pg 53
- ◆ Musculocutaneous nerve arises from the lateral cord not from the medial cord
- ◆ Radial nerve is a branch of posterior cord

Branches of :-

<u>Lateral cord</u>	<u>Medial cord</u>	<u>Posterior cord</u>
- Lateral pectoral	- Medial pectoral	- Upper subscapular
- Musculocutaneous	- Medial cutaneous nerve of arm	- Thoracodorsal (latissimus dorsi)
- Lateral root of median	- Medial cutaneous nerve of forearm	- Lower subscapular
	- Ulnar	- Axillary nerve
	- Medial root of median	- Radial nerve

484. (c) Pectoral

(Ref : BDC, 4th/e Vol I, Pg 42)

Lymphatic drainage of breast : - (Pg 42-43)

- ◆ 75% of lymph → Axillary nodes
- ◆ 20% → into internal mammary
- ◆ 5% → posterior intercostal nodes

Among the axillary nodes, the lymphatics end mostly in the anterior group (closely related to axillary tail of spence)

(Anterior group → Pectoral group) Pg 42

- ◆ The lymph from the sub areolar plexus (of sappy) and most of the breast drains into the anterior or pectoral group of lymph nodes. Though the internal mammary nodes drain the lymph not only from the inner half of the breast, but from the outer half as well

(c) remains the option of choice

485. (a) Flexion

(b) Medial rotation

(Ref : BDC, 4th/e Vol I, Pg 76)

Deltoid :-Actions :-

(1) Acromial fibres are powerful abductors of the arm at the shoulder from 15-90°

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

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

Nerve Supply :-

Axillary nerve (C5, C6)

486. (a) Lateral

(Ref : BDC, 4th/e Vol I, Pg 55)

In the third part of the axillary artery its relation with the musculocutaneous nerve is that it is medial to the nerve

Other lateral relations in the third part are :-

(1) Coracobrachialis

(2) Lateral root of median nerve

(3) Trunk of median nerve in the lower part

487. (c) Lesser wing and body of sphenoid

(Ref : B.D.C. 4th/e Vol III, Pg 22)

- ◆ The optic canal leads to the orbit. It is bounded laterally by the lesser wing of sphenoid, in front and behind the roots of the lesser wing, and medially by the body of the sphenoid
- ◆ The superior orbital fissure opens into the orbit. It is bounded superiorly by the lesser wing, inferiorly by the greater wing, and medially by the body of sphenoid
- ◆ The lower border of the fissure is marked by a small projection which provides attachment to the ring of Zinn.

488. (c) It innervates the lateral rectus

(Ref : B.D.C., 4th/e Vol III, Pg 113)

Remember this!

◆ SO4 LR6

- ◆ This means that except the superior oblique which is supplied by the trochlear (IV) nerve, and the lateral rectus muscle, which is supplied by the Abducent (VI) nerve, all extraocular muscles are supplied by the oculomotor nerve

◆ Total paralysis of oculomotor nerve leads to :

(a) Ptosis

(b) Lateral squint

(c) Dilatation of the pupil (mydriasis)

(d) Loss of accommodation

(e) Slight proptosis

(f) Diplopia

- ◆ Weber's syndrome - A midbrain lesion
 - Contralateral hemiplegia
 - Ipsilateral paralysis of third nerve
- ◆ Supranuclear paralysis of the third nerve causes loss of conjugate movements of the eye.

489. (c) Inferior meatus

(Ref : B.D.C. 4th/e Vol III, Pg 63)

It is a membranous passage 18mm long beginning at the lower end of the lacrimal sac, running downwards, backwards and laterally, and open into the inferior meatus of the nose.

A fold of mucous membrane called the **valve of Hasner** forms an imperfect valve at the lower end of the duct.

During the development of face :

5 processes are involved

- ◆ 1 frontonasal
- ◆ 2 maxillary
- ◆ 2 mandibular

Frontonasal process forms :

- ◆ Forehead
- ◆ Nasal septum
- ◆ Philtrum of upper lip
- ◆ Premaxilla bearing upper 4 incisor teeth

Maxillary process forms :

- ◆ Whole upper lip except the philtrum
- ◆ Most of the hard and the soft palate except premaxilla

Mandibular processes form the lower lip

Cord of ectoderm gets buried at the junction of frontonasal and maxillary processes and canalization of this ectodermal cord of cells gives rise to nasolacrimal duct.

490. (b) Glossopharyngeal

(Ref : BDC, 4th/e Vol III, Pg 261)

The nerve supply of the middle ear cavity is derived from the tympanic plexus which lies over the promontory. The plexus is formed by the following :

- (a) The tympanic branch of the glossopharyngeal nerve. It's fibres are distributed to the mucous membrane of the middle ear, the auditory tube, the mastoid antrum and air cells. It also gives off the lesser petrosal nerve.
- (b) The superior and inferior caroticotympanic nerve arise from the sympathetic plexus around the internal carotid artery, and these fibres are vasomotor to the mucous membrane.

Muscles of the middle ear :- There are two muscles and both act to dampen the intensity of high pitched sound waves, protecting the internal ear.

- (a) **Tensor tympani** : supplied by the mandibular nerve. The fibres pass through the nerve to the medial pterygoid and through the otic ganglion without any relay. It is inserted onto the handle of malleolus and arises out of the walls of the canal in the anterior wall of the middle ear cavity above the opening of the auditory tube.
- (b) **Stapedius** : supplied by the facial nerve. It arises out of the walls of a canal in the posterior wall of the middle ear cavity, which is continuous with the vertical canal for the facial nerve, and it opens anteriorly on the summit of the pyramid and is inserted on the posterior surface on the neck of stapes. It develops from the mesoderm of the second branchial arch

Joints :-

The incudomalleolar joint is a saddle joint

The incudostapedial joint is a ball and socket joint

Prussak's pouch :-

Laterally - pars flaccida

Medially - neck of malleolus

Anteriorly and posteriorly by malleolar folds

It does not drain easily and inflammatory exudates in the pouch often lead to perforation of the pars flaccida

Narrowest part of the middle ear cavity is the mesotympanum

Inner ear is present in the petrous part of temporal bone

491. (d) Levator palati muscle and the cartilaginous Eustachian tube
(Ref : BDC, 4th/e Vol III, Pg. 221- 223)

- ◆ The large gap between the base of the skull and the upper border of the superior constrictor muscle is semilunar and is called the **sinus of Morgagni**
- ◆ It is closed by the upper strong part of the pharyngobasilar fascia
- ◆ The structures passing through this gap are :
 - The auditory tube
 - Levator veli palatini muscle
 - The ascending palatine artery
- ◆ The structures passing through the gap between superior and middle constrictors are :
 - Stylopharyngeus muscle
 - Glossopharyngeal nerve
- ◆ The structures passing through the gap between middle and inferior constrictors are :
 - Internal laryngeal nerve
 - Superior laryngeal vessels
 - They pierce the thyrohyoid membrane.
- ◆ The recurrent laryngeal nerve and inferior laryngeal vessels pass through the gap between the lower border of the inferior constrictor and the esophagus

- ◆ Killian's dehiscence : It is the posterior wall of the pharynx
 - The lower part of the thyropharyngeus muscle is a single sheet and is not overlapped by upper and middle constrictors
 - It is below the level of the vocal cords or at the level of cricoid lamina
 - Below it, is the narrowest part of the G.I.T the cricopharynx, the cricopharyngeus muscle
 - Thyropharyngeus is supplied by pharyngeal plexus and the sphincteric cricopharyngeus is supplied by the recurrent laryngeal nerve.
 - Pharyngeal diverticula are often attributed to the neuromuscular incoordination in this region, as in if the cricopharyngeus fails to relax when the thyropharyngeus contracts the bolus of food is pushed backwards and tends to produce a diverticula

492. (b) Inferior thyroid artery

(Ref : B.D.C. 4th/e Vol III, Pg 185)

The right recurrent laryngeal nerve :

- ◆ Arises from the vagus, in front of the right subclavian artery
- ◆ Winds backwards below the artery, and then runs behind the subclavian and common carotid arteries, to reach the tracheo-esophageal groove.
- ◆ In the upper part of the groove it is related to the inferior thyroid artery
- ◆ Passes deep to the lower border of the inferior constrictor muscle, enters larynx behind the cricothyroid joint
- ◆ Supplies :
 - All intrinsic muscles of the larynx except cricothyroid
 - Sensory supply to larynx below the vocal cords
 - Cardiac branches to the deep cardiac plexus
 - Branches to the trachea and esophagus
 - The inferior constrictor
- ◆ The left recurrent laryngeal nerve :
 - Arises from vagus in thorax, as it crosses the left side of the arch of aorta
 - Loops around ligamentum arteriosum and reaches the tracheo - esophageal groove
 - Its distribution is similar to the right nerve
 - It is posterior to the inferior thyroid artery

493. (b) Inferior thyroid artery

(Ref : BDC, 4th/ e Vol I, Pg 269)

◆ Arterial supply of esophagus :

- The cervical part of esophagus including the segment upto the arch of aorta is supplied by the inferior thyroid artery

- The thoracic part is supplied by the esophageal branches of the aorta
- The abdominal part is supplied by the esophageal branches of the left gastric artery.
- ◆ Venous drainage :-
 - Upper part - brachiocephalic veins
 - Middle part - azygous veins
 - Lower part - left gastric vein
- ◆ Lymphatic drainage :-
 - Cervical part - deep cervical nodes
 - Thoracic part - posterior mediastinal nodes
 - Abdominal part - left gastric nodes
- ◆ Nerve supply :
 (i) Parasympathetic nerves : (sensory, motor and secretomotor)
 (a)Upper half - recurrent laryngeal nerves
 (b)Lower half - esophageal plexus formed mainly by the two vagi
 (ii) Sympathetic nerves : (vasomotor)
 (a)Upper half - fibres from the middle cervical ganglion and run on the inferior thyroid arteries
 (b)Lower half - from upper four thoracic ganglions, form the esophageal plexus before supplying the esophagus
- ◆ Towards the lower end the vagi form the anterior and posterior gastric nerves which enter the abdomen through the esophageal opening of the diaphragm.
- ◆ Esophageal plexus is mainly formed by the parasympathetics through the vagi but sympathetic fibres are also involved

494. (b) Injury to IX nerve

(Ref : BDC, 4th/e Vol III, Pg 183)

Branches and distribution :-

- ◆ Tympanic nerve : is a branch of the inferior ganglion of the glossopharyngeal nerve
- ◆ Carotid branch : descends on the internal carotid artery supplies the carotid sinus and the carotid body
- ◆ The pharyngeal branches : form the pharyngeal plexus along with the vagi and sympathetic fibres. The glossopharyngeal fibres are distributed to the mucous membrane of the pharynx.
- ◆ Muscular branch : stylopharyngeus
- ◆ Tonsillar branch : supply the tonsil and join the lesser palatine nerve to supply the soft palate and the palatoglossal arch
- ◆ The lingual branch : carry taste and general sensations from the posterior 1/3 of the tongue.

Isolated lesions of the IX nerve are almost unknown they usually occur with lesions of the X nerve

Pharyngitis may cause referred pain in the ear. In these cases Eustachian catarrh should be excluded

495. (c) Greater auricular nerve

(Ref : BDC 4th/e Vol III, Pg 57)

Sensory nerve supply of the face :

Chief sensory nerve of the face :

- ◆ The trigeminal nerve through it's three branches
- ◆ The skin over the angle of the jaw is supplied by the great auricular nerve
- ◆ The sensory distribution of the trigeminal nerve explains why headache is the common symptom in, common cold, boils, sinusitis, infections of the gums and teeth, refractive errors of the eyes, glaucoma and meningitis

Source	Cutaneous nerve	Area of distribution
A. Ophthalmic division	(1) Supratrochlear nerve (2) Supraorbital nerve (3) Lacrimal nerve (4) Infratrochlear nerve (5) External nasal nerve	Scalp upto vertex, forehead, upper eyelid, conjunctiva, small part of lower eyelid, root dorsum and tip of nose.
B. Maxillary division of trigeminal nerve	(1) Infraorbital nerve (2) Zygomaticofacial nerve (3) Zygomaticotemporal nerve	Upper lip Side and ala of nose Most of lower eyelid upper part of cheek Anterior part of temple
C. Mandibular division of trigeminal nerve	(1) Auriculotemporal nerve (2) Buccal nerve (3) Mental nerve	Lower lip Chin Lower part of cheek Lower jaw except over the angle Upper 2/3 of lateral surface of auricle Side of head
D. Cervical plexus	(1) Anterior division of greater auricular nerve (C2, C3) (2) Upper division of transverse cutaneous nerve of neck	Skin over the angle of the jaw and over the parotid gland. Lower margin of the lower jaw

496. Ans (b) Abduction and lateral rotation

(Ref : BDC, 4th/e Vol I, Pg 16, 76)

Muscles attached to the greater tuberosity of humerus

(1) Supraspinatus into the upper most impression

(2) Infraspinatus into the middle impression

(3) Teres minor into the lower impression

Muscle	Nerve supply	Action
(1) Supraspinatus	Suprascapular nerve (C5,C6)	- Initiates abduction of arm and carries it upto 15° - Stabilises the head of humerus in the glenoid cavity with other short scapular muscles
(2) Infraspinatus	Suprascapular nerve (C5,C6)	- Lateral rotator of arm - Also helps in stabilisation of shoulder joint
(3) Teres minor	Axillary nerve (C5,C6)	- Same as infraspinatus

497. Ans (b) Median nerve alone

(Ref : BDC, 4th/e Vol II, Pg 125)

Median nerve injury at wrist is a common occurrence and is characterised by the following signs :-

(a) Control over coarse movements of hand is lost. In fact, inability to oppose the thumb is the chief disability of median nerve lesions of the wrist

(b) Ape - like hand :-

- Paralysis of short muscles of thumb and the unopposed action of extensor pollicis longus produces an ape-like hand
- Thenar eminence - wasted & flattened

(c) Pen test for adductor pollicis brevis

(d) Sensory loss corresponds to distribution of the median nerve in the hand

♦ If both median and ulnar nerves are paralysed, the result is complete claw - hand

498. Ans (b) Diencephalon

(Ref : Gray's Anatomy 39th/e pg 710)

"The retina is the sensory neural layer of the eye ball. It is a most complex structure and should be considered as a spinal area of the brain, from which it is derived by outgrowth from the diencephalon".

499. Ans (b) C7

(Ref : BDC, 4th/e Vol III, Pg 43)

The seventh cervical vertebra is also known as the vertebra prominens because of its long spinous process, the tip of which can be felt through the skin at the lower end of the nuchal furrow.

Attachments to the C7 tip of spine :-

- ◆ Ligamentum nuchae
- ◆ Trapezius
- ◆ Rhomboideus minor
- ◆ Serratus posterior superior
- ◆ Splenius capitis
- ◆ Semispinalis thoracis
- ◆ Spinalis cervicis
- ◆ The interspinales
- ◆ The multifidus

500. Ans (d) Anterior rami of S2,S3,S4

(Ref : BDC, 4th/e Vol II, Pg 391)

Pelvic splanchnic Nerves/ Nerves Erigentes :-

- ◆ Represents the sacral outflow of the parasympathetic nervous system
- ◆ Nerves arise as fine filaments from the ventral rami of S2,S3,S4
- ◆ They join → Inferior hypogastric plexus & distributed to pelvic organs
- ◆ Some fibres ascend via hypogastric nerve → Superior hypogastric plexus → Inferior mesenteric plexus
- ◆ Others → hindgut derived colon

501. Ans (a) Uterine artery

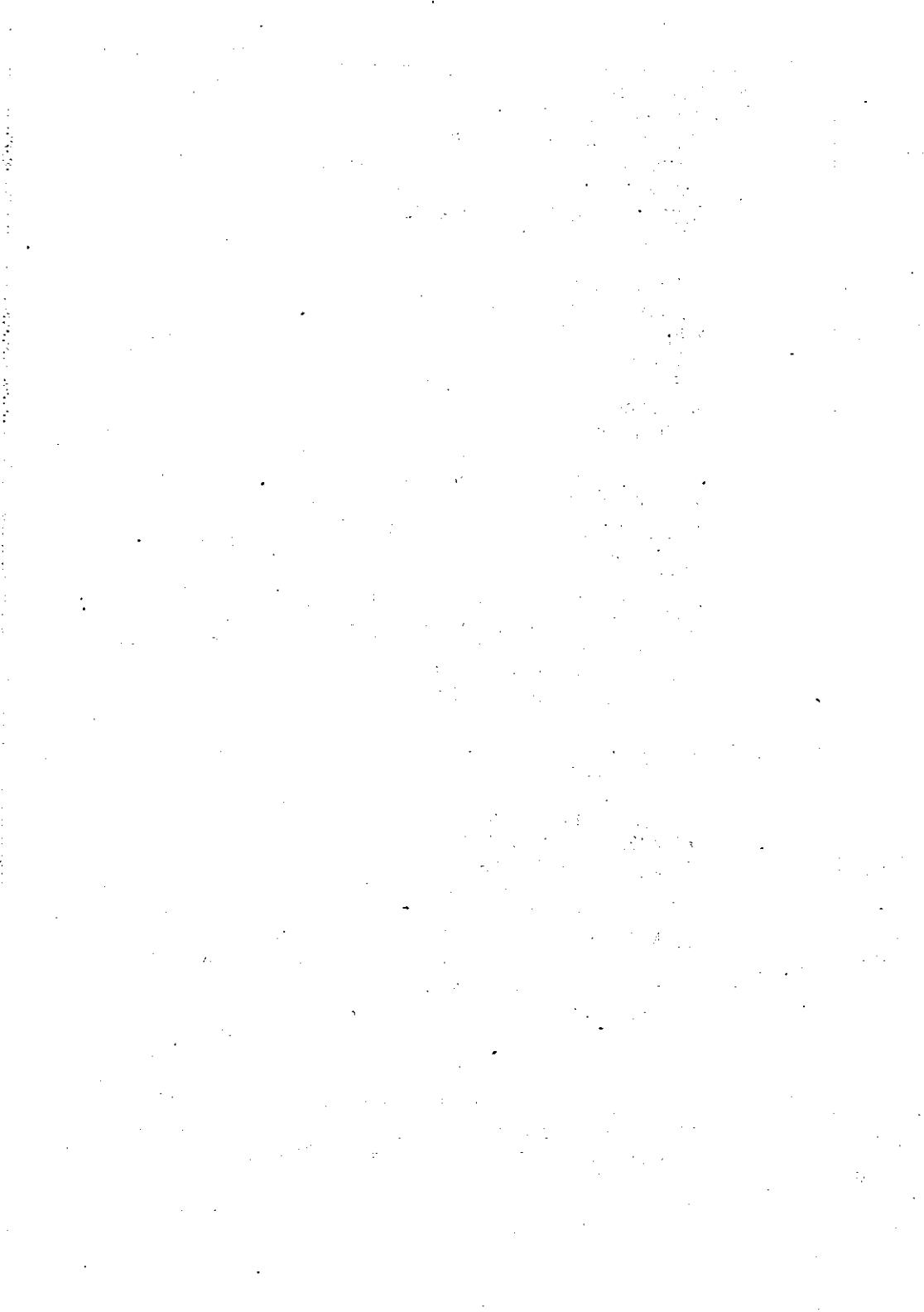
- (a) Uterine artery
- (b) Inferior vesical artery
- (c) Testicular artery
- (d) Common iliac artery

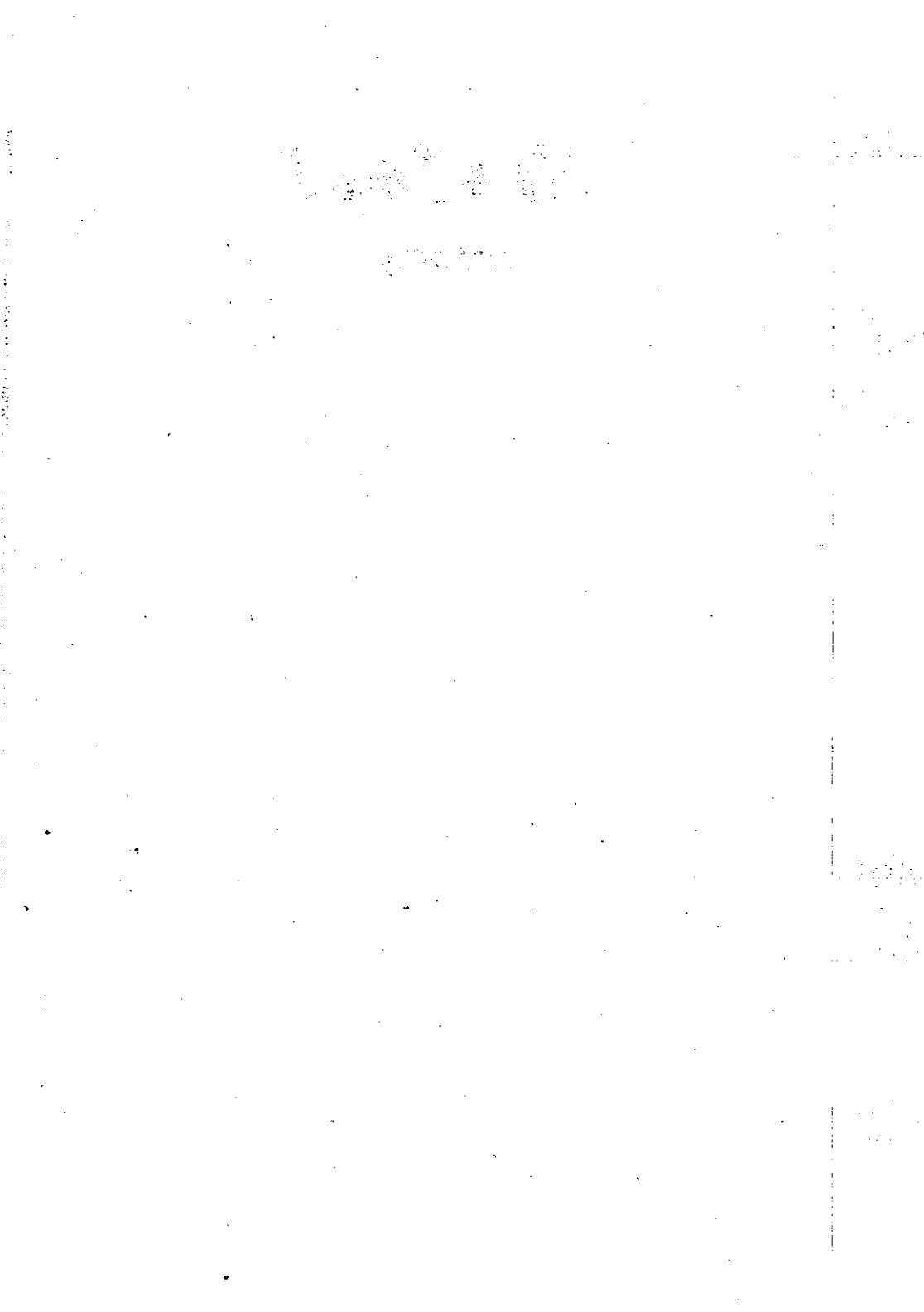
(Ref : BDC, 4th/e Vol II, Pg 303)

Blood supply of ureter :-

- | | |
|-----------------|---|
| (A) Upper part | → Branches from the renal artery
Branches form gonadal (or) colic vessels |
| (B) Middle part | → Branches from the aorta
Also branches from gonadal / or iliac vessels |
| (C) Pelvic part | → Branches from <ul style="list-style-type: none"> - vesical - middle rectal - uterine vessels |

The arteries of the ureter lies closely attached to the peritoneum, they divide into ascending and descending branches which first form a plexus on the surface of the ureter and then supply it.





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