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\mu m (micrometers)  
   b. 100\mu m   
   c. 120\mu m   
   d. 500\mu 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. Paraaoctic 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
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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 gastroepiploic artery
   c. Right gastroepiploic 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. 6-12 mm Hg
   c. 12-15 mm Hg
   d. 45 mm 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
<table>
<thead>
<tr>
<th>Number</th>
<th>Question</th>
<th>Options</th>
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<tbody>
<tr>
<td>120</td>
<td>The least dilatable part of the urethra - (CUPGEE 95)</td>
<td>a. Prostatic</td>
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<td>b. Membranous</td>
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<td></td>
<td></td>
<td>c. Spongy</td>
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<td>d. All are equally dilatable</td>
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<td>121</td>
<td>During abdominal surgery under local anaesthesia patient suddenly felt sharp pain. Injury to structure likely involved - (AIIMS 2K)</td>
<td>a. Liver parenchyma</td>
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<td></td>
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<td>b. Large gut</td>
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<td>c. Small gut</td>
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<td>d. Parietal peritoneum</td>
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<tr>
<td>122</td>
<td>The development of diaphragm is from - (AIIMS 81)</td>
<td>a. Septum transversum</td>
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<td>b. Pleuropericardial membranes</td>
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<td>c. Pleuroperitoneal membranes</td>
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<td>d. (a) and (c) are true</td>
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<td></td>
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<td>e. (b) and (c) are true</td>
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<td>123</td>
<td>The lesser peritoneal sac (omentum bursa) is bounded - (PGI 78, AIIMS 75)</td>
<td>a. Anteriorly by the stomach</td>
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<td>b. Posteriorly by the ileum</td>
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<td>c. Posteriorly by the pancreas</td>
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<td>d. Posteriorly by the lesser omentum</td>
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<td>124</td>
<td>The posteroinferior surface of the liver is related to the - (JIPMER 78, PGI 80)</td>
<td>a. Right kidney</td>
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<td>b. Hepatic flexure of the colon</td>
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<td>c. Duodenum</td>
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<td>d. Esophagus</td>
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<td>125</td>
<td>Buck's fascia is related to - (JIPMER 78, AMU 86)</td>
<td>a. Ischiorectal fascia</td>
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<td>b. Thigh</td>
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<td>c. Neck</td>
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<td>d. Penis</td>
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</tbody>
</table>
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126. Structure found in the superficial perineal space (pouch) of the male include the - (PGI 78, 82)
   a. Bulb of the penis
   b. Bulbo spongiosus muscle
   c. Ischiocavernosus muscle
   d. Superficial transverse perinei muscles
   e. None

127. The posterior wall of inguinal canal are formed by many structures that include - (JIPMER 79, PGI 87)
   a. Conjoint tendon
   b. Transversus abdominis
   c. Fascia transversalis
   d. Lacunar ligament

128. Which of the following statements concerning the nerve supply to the urinary bladder is / are correct (PGI 80) (AIIMS 83)
   a. The sympathetic post ganglionic fibre originate in the first and second lumbar ganglia
   b. The parasympathetic preganglionic fibres synapse with post. ganglionic neurons in the inferior hypogastric plexus
   c. The afferent sensory fibres arising in the bladder reach the spinal cord via the pelvic splanchnic nerves and also travel with the sympathetic nerves
   d. The parasympathetic preganglionic fibres arise from S2, S3, S4
   e. All of the above

129. The right suprarenal gland is related to the - (JIPMER 80, PGI 81)
   a. Third part of the duodenum
   b. Inferior vena cava
   c. Transverse colon
   d. Right lobe of the liver

130. The coeliac nodes receive lymphatic drainage from the - (JIPMER 80, AMC 84)
   a. Liver
   b. Spleen
   c. Pancreas
   d. Duodenum
   e. 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. Cili’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
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
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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
164. **The efferent limb of the cremaster reflex is provided by the -**
   - 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 :**
   - 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 -**
   - a. Gonadal veins
   - b. Superior mesenteric artery
   - c. Portal vein
   - d. Inferior mesenteric vein

167. **The first costochondral joint is a -**
   - a. Fibrous joint
   - b. Synovial joint
   - c. Syndesmosis
   - d. Synarthrosis

168. **Blood supply of sigmoid colon is by**
   - a. Middle colic A
   - b. Marginal artery
   - c. Left colic artery
   - d. Sigmoid artery

169. **Not true about the anal canal is**
   - 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**
   - 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 viscus 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 viscus 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 - 5-7µm

Approximately 58.3µm

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

♦ 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
Abdomen 85

- 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 5-7µm, 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 bulbospon-
giosus.

103. (d) None of the above
(Ref: BDC 4th/e vol. II - pg 220)
Embryological remnants present in relation to testes
There 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 supraclavicular lymph node (Troisier’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

Veinous 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
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(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 vasomotor
   → 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 mackenrod'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 up to 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 pancreatoduodenal
(2) Middle colic
(3) Right colic
(4) Iliocolic
* From the left are 12-15 jejunal & ileal branches.

Coeliac 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 pancreatoduodenal
  (b) The right gastric artery
  (c) The supraduodenal artery
  (d) The cystic artery
(3) Splenic artery - the largest branch of coeliac 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 xiphoid 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 Denovilliers:
   - It extends from the rectum behind to the seminal vesicles and prostate in front
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(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 pleuropertitoneal hiatus or foramen of bochdalek situated at the periphery of diaphragm in the regions of the attachments to the 10th & 11th ribs.
Abdomen

- 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
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♦ 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 the 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 anastomose 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 and 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
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- 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

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

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

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 gastroplenic 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.
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125. (d) Penis

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

♦ The superficial fascia of penis consists of very loosely arranged
aeolar 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

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Superficial - Colles fascia</td>
<td>same</td>
</tr>
<tr>
<td>(b) Deep - Perineal membrane</td>
<td>same</td>
</tr>
<tr>
<td>(c) On each side - Ischiopubic rami</td>
<td>same</td>
</tr>
<tr>
<td>(d) Posteriorly - closed by the fusion of perineal membrane with colle’s fascia</td>
<td>same</td>
</tr>
<tr>
<td>(e) Anteriorly - Open and continuous with the spaces of the scrotum, penis and the anterior abdominal wall</td>
<td>Open and continuous with the spaces of the clitoris and the anterior abdominal wall</td>
</tr>
</tbody>
</table>

Contents: -
(1) Rest of penis, made up of 2 corpora cavernosa and one corpus spongiosum traversed by the urethra
(2) 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
(b) Bulbospongiosus covering corpus spongiosum, both are united by a median raphe
(c) Superficial transverse perinei

Bulb of penis is covered by bulbospongious

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** -
   (a) In its whole extent
      (1) Skin
      (2) Superficial fascia
      (3) External oblique aponeurosis
   (b) In its lateral one third : the fleshy fibres of the internal oblique muscle

(B) **The posterior wall** :-
   **In its whole extent** :
      (1) Fascia transversalis
      (2) Extraperitoneal tissue
      (3) The parietal peritoneum
   **In its medial 2/3rds**
      (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
Anatomy

**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
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

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
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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. **Infra lateral surfaces**
   - **In males:** each surface is related to
     - pubis
     - puboprostatic ligaments
     - retropubic fat
     - levator ani
     - obturator internus
   - **In females:** 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*
Abdomen 107

- 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
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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:
  - Renal vessels
  - Second part of duodenum
  - On (Rt) 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
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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 2.5 cm and then it crosses it superiorly from lateral to medial side
- The ureter lies about 2 cm 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 5 cm apart in a distended bladder and only 2.5 cm 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 2.5 cm 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
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(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)
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- 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. body
    3. 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 other 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 artery 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 1.25 cm 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:
Abdomen 113

(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
Anatomy

- Adenoma never occurs here
- Primary Ca. is said to begin here

(3) Median 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

<table>
<thead>
<tr>
<th>True capsule</th>
<th>False capsule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condensation of the peripheral part of the gland</td>
<td>lies outside the true capsule and derived from pelvic fascia</td>
</tr>
<tr>
<td>fibromuscular and is continuous with stroma of gland</td>
<td>Anteriorly, continuous with pubo prostatic ligament</td>
</tr>
<tr>
<td>contains no venous plexus</td>
<td>Posteriorly it is avascular formed by fascia of Denonvilliers</td>
</tr>
</tbody>
</table>

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    Multiparous woman
- Vertical            - Horizontal
- Upper pole (tubal pole) and  - Upper pole points laterally
  lower pole (uterine pole)  - 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 posterosuperior 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
Anatomy

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

(2) The uterine artery

Venous drainage :-

Pampiniform plexus

↓

Ovarian vein

↓

(Rt) side

(Lt) side

I.V.C left renal vein

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 columns are united \(\rightarrow\) transverse folds called anal valve
- Above each valve, a depression called anal sinus
- Anal valves together form a transverse line \(\rightarrow\) 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 \(\rightarrow\) 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 vessels 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)
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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 Z'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

<table>
<thead>
<tr>
<th>Jejunum</th>
<th>Ileum</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Villi are tongue shaped</td>
<td>- Villi are few, thin &amp; finger like</td>
</tr>
<tr>
<td>- No mucous glands or aggregated lymphoid follicles are present in submucosa</td>
<td>- Collection of lymphocytes in the form of peyer’s patches in lamina propria extending into the submucosa is a characteristic feature</td>
</tr>
</tbody>
</table>

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
Anatomy

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 ::

<table>
<thead>
<tr>
<th>Left kidney</th>
<th>Right kidney</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Left suprarenal gland</td>
<td>- Right suprarenal gland</td>
</tr>
<tr>
<td>- Stomach*</td>
<td>- Liver*</td>
</tr>
<tr>
<td>- Pancreas</td>
<td>- Second part of duodenum</td>
</tr>
<tr>
<td>- Splenic vessels*</td>
<td>- Hepatic flexure of colon</td>
</tr>
<tr>
<td>- Splenic flexure &amp; descending colon</td>
<td>- Small intestine*</td>
</tr>
<tr>
<td>- Jejunum*</td>
<td>- Lateral border of kidney is related to the right lobe of liver and to the hepatic flexure of colon</td>
</tr>
<tr>
<td>- Covered by peritoneum</td>
<td>- Related to Coeliac trunk</td>
</tr>
<tr>
<td></td>
<td>- Hepatic artery</td>
</tr>
</tbody>
</table>

154. (b) Splenic artery
(Ref: BDC 4th/e vol. II - pg 286)
Relations of body of pancreas ::
The body of pancreas has 3 borders and 3 surfaces:
- Anterior border - provides attachment to transverse mesocolon
- Superior border - Related to Coeliac trunk
- Inferior border - Related to Hepatic artery
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- 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 conal 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:

<table>
<thead>
<tr>
<th>Anterior division</th>
<th>Posterior division</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 branches</td>
<td>(1) Iliolumbar</td>
</tr>
<tr>
<td>(1) Superior vesical</td>
<td>(2) Two lateral sacral</td>
</tr>
<tr>
<td>(2) Obturator</td>
<td>(3) Superior gluteal arteries</td>
</tr>
</tbody>
</table>
(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
  - 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

<table>
<thead>
<tr>
<th>Ventral part</th>
<th>Dorsal part</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forms ligaments of liver</td>
<td>Lesser omentum</td>
</tr>
<tr>
<td>- The falciform ligament</td>
<td></td>
</tr>
<tr>
<td>- The right and left triangular ligaments</td>
<td></td>
</tr>
<tr>
<td>- The superior &amp; inferior layers of the coronary ligament</td>
<td></td>
</tr>
</tbody>
</table>

Fate of dorsal mesogastrium
1. The greater / caudal part → greater omentum
2. Cranial part divided by developing spleen

<table>
<thead>
<tr>
<th>Dorsal part</th>
<th>Ventral parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Lienorenal ligament</td>
<td>- Gastrosplenic ligament</td>
</tr>
</tbody>
</table>
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 prostatic 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
- Rest of the duodenum
- Jejunum
- The ileum
- The appendix
- The caecum
- The ascending colon
- The right two-thirds of transverse colon

Hindgut forms
- 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 vasomotor 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
- On the side of rectum
- The seminal vesicle
- The prostate
- Posterior part of urinary bladder

Female
- 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

(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

(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 gastroepiploic 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

(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
Abdomen

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
- 3 cm 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
- 3 cm deep
- Orifice looks downwards & to the right

(6) Mesentricoparietal 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
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(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
Abdomen 129

- 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
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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

<table>
<thead>
<tr>
<th>Features</th>
<th>Jejunum</th>
<th>Ileum</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Location</td>
<td>Occupies upper &amp; left parts of intestinal area</td>
<td>Occupies lower &amp; right parts of intestinal area</td>
</tr>
<tr>
<td>(2) Walls</td>
<td>Thicker and more vascular</td>
<td>Thinner and less vascular</td>
</tr>
<tr>
<td>(3) Lumen</td>
<td>Wider and often empty</td>
<td>Narrower and often loaded</td>
</tr>
<tr>
<td>(4) Mesentery</td>
<td>(a) Windows present</td>
<td>(a) No windows</td>
</tr>
<tr>
<td></td>
<td>(b) Fat less abundant</td>
<td>(b) Fat more abundant</td>
</tr>
<tr>
<td></td>
<td>(c) Arterial arcades, 1 or 2</td>
<td>(c) Arterial arcades, 3/6</td>
</tr>
<tr>
<td></td>
<td>(d) Vasa recta longer &amp; fewer</td>
<td>(d) Vasa recta shorter &amp; more numerous</td>
</tr>
<tr>
<td>(5) Circular mucosal folds</td>
<td>Larger and more closely set</td>
<td>Smaller and sparse</td>
</tr>
<tr>
<td>(6) Villi</td>
<td>Large, thick (leaf like) and more abundant</td>
<td>Shorter, thinner (finger like) and less abundant</td>
</tr>
<tr>
<td>(7) Peyer’s patches</td>
<td>Absent</td>
<td>Present</td>
</tr>
<tr>
<td>(8) Relatively lymphatic follicles</td>
<td>Fewer</td>
<td>More numerous</td>
</tr>
</tbody>
</table>

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 he 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.
Anatomy

- The dural sac (theca), and thus the subarachnoid space and its contained C.S.F. 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.

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 albugenia in ovary and cortical part of gonad predominate

**Ducts** :-

- In female :-
  - Mullerian (or) paramesonephric duct predominates
  - This duct is lateral to mesonephric duct
  - 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

Cloacal folds

- Anteriorly: urethral folds
- Posteriorly: Anal folds

At same time

Cloacal membrane

- Anteriorly: Urogenital membrane
- Posteriorly: Anal membrane

• 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