NEET PG Anatomy Sample Paper-10

Duration: 15 Minutes **Maximum Marks: 68**

Instructions

- This paper contains **17** Multiple Choice Questions.
- Each correct answer carries **+4** mark. Incorrect answer: **−1** marks. Only **one** correct option.
- Unattempted questions carry **0** marks.
- Use of mobile phones, smartwatches, or any electronic gadgets is strictly prohibited.

Q1. A 42-year-old male presents with severe epigastric pain radiating to the back due to a posterior penetrating duodenal ulcer. During emergency laparotomy, severe hemorrhage is noted from an artery running immediately posterior to the first part of the duodenum. Which of the following statements correctly evaluates the collateral vascular pathways involved if this bleeding vessel is surgically ligated?

(A) Blood flow to the greater curvature of the stomach will be completely abolished via the left gastroepiploic pathway.

(B) Retrograde flow from the inferior pancreaticoduodenal artery via the SMA will maintain perfusion to the lower pancreatic head.

(C) The proper hepatic artery will lose its primary perfusion source, resulting in ischemic necrosis of the left hepatic lobe.

(D) The cystic artery will experience a complete pressure drop due to acute reversal of flow through the right gastric artery.

Q2. During a routine lymphadenectomy for a testicular germ cell tumor, the surgeon accidentally damages a small vessel running directly across the anterior surface of the psoas major muscle, medial to the genitofemoral nerve. Assuming normal anatomical variants, which structural compromise is most likely to be observed postoperatively?

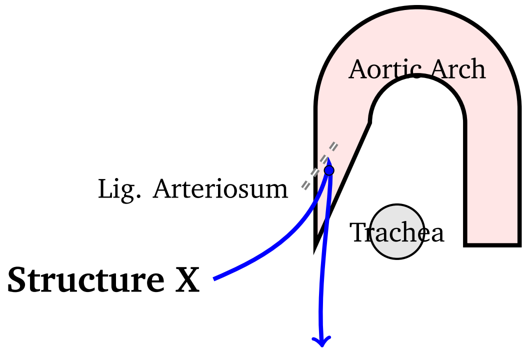
(A) Ischemic necrosis of the ipsilateral adrenal gland cortex.

(B) Loss of collateral systemic venous return from the lower limb via the ascending lumbar vein.

(C) Compromised arterial blood supply to the middle third of the ureter and deep testicular tissues.

(D) Selective sensory loss over the anterior aspect of the upper thigh and scrotum.

Q3. A patient presents with dysphagia and hoarseness. A contrast-enhanced CT shows a massive vascular aneurysm compressional anomaly within the superior-posterior mediastinum. Identify the structure labeled as **Structure X** in the schematic cross-sectional layout below that loops inferior to the aortic arch lateral to the ligamentum arteriosum:



(A) Right recurrent laryngeal nerve

(B) Left recurrent laryngeal nerve

(C) Right phrenic nerve

(D) Left principal bronchus autonomic plexus

Q4. An elite rock climber falls from a ledge and sustains an avulsion fracture of the lesser tubercle of the humerus. During clinical examination, the patient exhibits significant weakness during internal rotation of the arm. Which muscle's tendon insertion has been avulsed from its bony site?

(A) Supraspinatus

(B) Infraspinatus

(C) Subscapularis

(D) Teres minor

Q5. A football player suffers an impact injury to the posterolateral aspect of the knee joint. MRI reveals an isolated complete tear of the tendon that passes directly through the capsule of the knee joint, separating the lateral meniscus from the fibular collateral ligament. This damaged structure is primarily responsible for which biomechanical action?

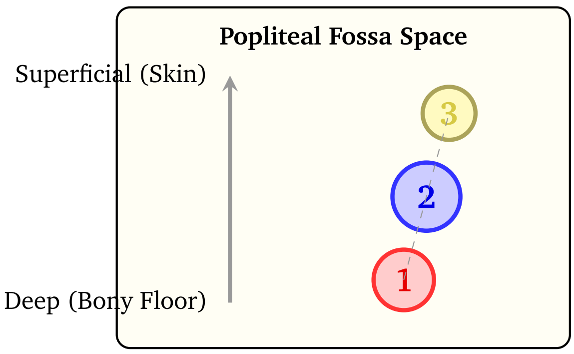
(A) Locking the fully extended knee joint by initiating internal rotation of the femur.

(B) Unlocking the extended knee joint by initiating external rotation of the femur on the fixed tibia.

(C) Preventing anterior translation of the tibia relative to the condyles of the femur.

(D) Assisting the biceps femoris in providing dynamic lateral stability during deep knee flexion.

Q6. A vascular surgeon is performing an embolectomy within the popliteal fossa. Identify the correct relative deep-to-superficial structural arrangement highlighted along the directional indicator line in the transverse popliteal cross-section schematic shown below:



(A) 1: Popliteal vein; 2: Popliteal artery; 3: Tibial nerve

(B) 1: Popliteal artery; 2: Popliteal vein; 3: Tibial nerve

(C) 1: Tibial nerve; 2: Popliteal vein; 3: Popliteal artery

(D) 1: Popliteal artery; 2: Tibial nerve; 3: Popliteal vein

Q7. A 63-year-old female presents with sudden onset of contralateral hemiballismus localized to the left upper and lower extremities. Neuroimaging confirms an acute ischemic infarct in a discrete, lens-shaped nucleus derived from the diencephalon. This clinical presentation is caused by the loss of direct excitatory output from this damaged nucleus to which target structure?

(A) Caudate nucleus via GABAergic fibers

(B) Globus pallidus internus (GPi) via glutamatergic fibers

(C) Putamen via dopaminergic projections

(D) Substantia nigra pars reticulata via cholinergic fibers

Q8. An occlusion of the paramedian branches of the basilar artery results in medial medullary syndrome. A patient with this condition presents with ipsilateral paralysis of the tongue muscles. Which fiber tract running immediately adjacent to the hypoglossal nerve rootlets within the medulla explains the concomitant contralateral loss of conscious proprioception, vibration, and discriminative touch?

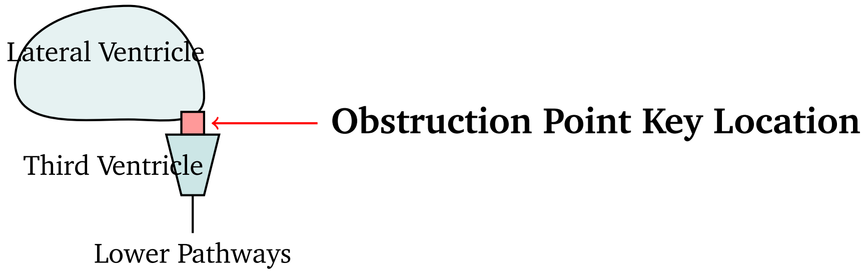
(A) Lateral spinothalamic tract

(B) Medial lemniscus

(C) Corticospinal tract

(D) Ventral spinocerebellar tract

Q9. A 9-month-old infant is diagnosed with non-communicating hydrocephalus. High-resolution MRI indicates selective dilation of both lateral ventricles and the third ventricle, while the fourth ventricle appears completely normal in size. Identify the precise site of obstruction matching the ventricular cast diagram indicated below:



(A) Median aperture of Magendie

(B) Cerebral aqueduct of Sylvius

(C) Interventricular foramina of Monro

(D) Lateral apertures of Luschka

Q10. A 55-year-old patient undergoes an extensive parotidectomy for a malignant mucoepidermoid carcinoma. Postoperatively, the surgeon checks for facial nerve integrity. The patient can close their eyes tightly and smile symmetrically, but when asked to protrude the jaw against resistance, a significant deficit is observed. Which specific neural pathway or branch has been compromised instead of the facial nerve during deep tissue dissection?

(A) Marginal mandibular branch of CN VII

(B) Mandibular division of CN V (via nerve to lateral pterygoid)

(C) Cervical branch of CN VII acting on platysma muscle

(D) Glossopharyngeal nerve (CN IX) styling plexus innervation

Q11. During a deep neck dissection for laryngeal carcinoma, the internal laryngeal nerve is accidentally transected on the right side. Which clinical deficit will be most distinct and characteristically demonstrated by this patient during a post-surgical evaluation?

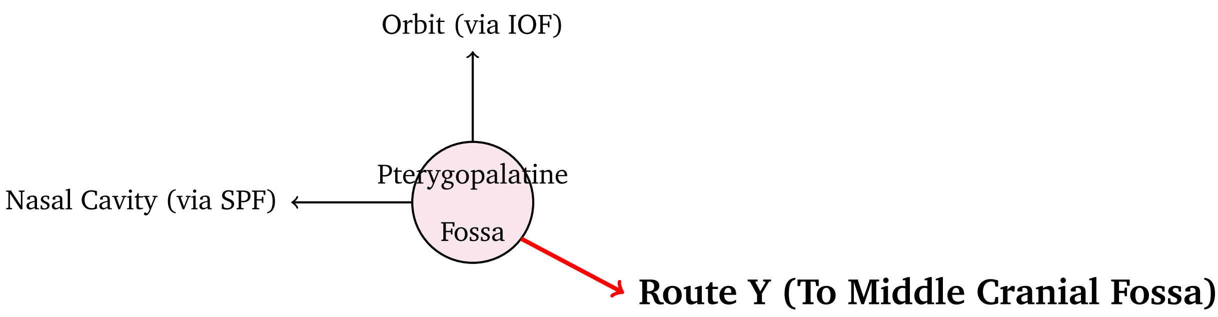
(A) Complete paralysis of the ipsilateral cricothyroid muscle leading to profound hoarseness.

(B) Loss of general sensation and cough reflex from the laryngeal mucosa superior to the vocal folds.

(C) Paroxysmal deviation of the epiglottis toward the contralateral side during deglutition.

(D) Loss of motor innervation to the posterior cricoarytenoid muscle, causing vocal cord fixed adduction.

Q12. A patient presents with an infection within the pterygopalatine fossa that has spread superiorly into the orbit. Analyze the schematic diagram of the bony channels connected to this fossa below and determine which specific opening or route (**Route Y**) allows direct communication between the pterygopalatine fossa and the middle cranial fossa:



(A) Foramen rotundum

(B) Sphenopalatine foramen

(C) Inferior orbital fissure

(D) Pterygoid canal (Vidian)

Q13. A newborn is noted to have a persistent discharge of clear, amber-colored fluid from the umbilicus when crying. Biochemical analysis reveals the fluid contains high concentrations of urea and creatinine, structural variants confirm a congenital failure of complete luminal occlusion. This clinical condition arises from the anomalous patency of a structure derived from which embryological precursor?

(A) Vitelline duct (Omphalomesenteric duct)

(B) Allantois (Urachus remnant)

(C) Left umbilical vein ligamentum teres pathway

(D) Physiological umbilical herniation loop core

Q14. An echocardiogram of a 3-week-old infant with cyanosis reveals a malformation where the aorta originates entirely from the morphological right ventricle and the pulmonary trunk arises from the morphological left ventricle. This classic transposition of the great vessels is fundamentally caused by a developmental failure of which embryonic structure?

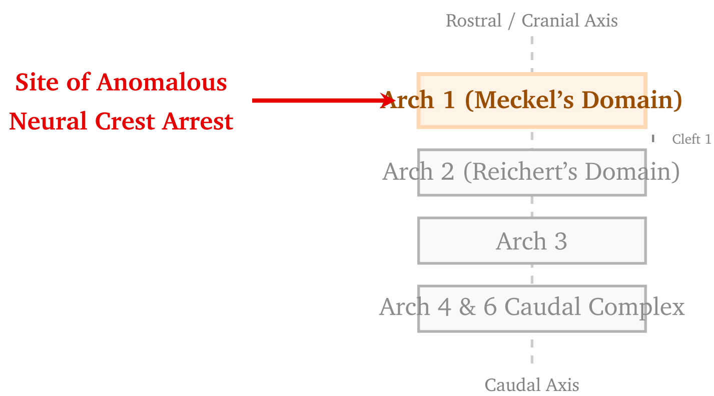
(A) Spiral septation failure of the truncus arteriosus and conus cordis

(B) Inadequate fusion of the dorsal and ventral endocardial cushions

(C) Defective expansion of the septum secundum over the ostium secundum

(D) Complete agenesis of the sinus venosus valves

Q15. A child presents with mandibular hypoplasia, down-slanting palpebral fissures, and malformed external ears (Treacher Collins Syndrome). This clinical presentation points to a severe defect in cranial neural crest cell migration and proliferation into a specific pharyngeal arch. Identify the affected arch corresponding to the targeted structural zone highlighted in the embryonic developmental schematic below:



(A) First Pharyngeal Arch

(B) Second Pharyngeal Arch

(C) Third Pharyngeal Arch

(D) Fourth Pharyngeal Arch

Q16. Biopsy of a specific section of the human gastrointestinal tract reveals the presence of highly specialized, coiled, branched tubular glands located exclusively within the submucosal layer. These glands secrete an alkaline fluid high in bicarbonate ions (HCO_3^-). From which exact anatomical region of the GI tract was this histological specimen retrieved?

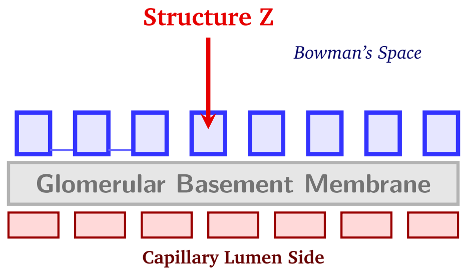
(A) Fundus of the Stomach

(B) Pyloric Antrum of the Stomach

(C) Submucosa of the Duodenum

(D) Ileum showing deep Peyer's patches

Q17. Transmission electron microscopy (TEM) of a renal cortical biopsy demonstrates the ultrastructure of the glomerular filtration barrier. Identify the specific cellular component labeled as **Structure Z** in the stylized schematic of the capillary wall barrier shown below, which provides filtration slits covered by a thin slit diaphragm:



(A) Fenestrated endothelial cell layer

(B) Podocyte pedicels (foot processes)

(C) Mesangial matrix support stalks

(D) Proximal convoluted tubule brush border microvilli

Detailed Solutions

Q1.

Solution

Concept: The **gastroduodenal artery (GDA)** runs immediately posterior to the first part of the duodenum ($L1$ level). It is a direct branch of the common hepatic artery. Deeply penetrating posterior duodenal ulcers frequently erode this vessel, resulting in life-threatening upper gastrointestinal hemorrhage that necessitates surgical ligation.

Solution:

Let's analyze the vascular dynamics and collateral pathways following the ligation of the gastroduodenal artery:

(a) The GDA bifurcates into the right gastroepiploic artery and the **superior pancreaticoduodenal artery** (which has anterior and posterior branches).

(b) The superior pancreaticoduodenal artery forms a crucial, highly redundant anastomotic network around the head of the pancreas and the C-loop of the duodenum with the **inferior pancreaticoduodenal artery** (anterior and posterior branches), which arises directly from the **superior mesenteric artery (SMA)**.

(c) When the GDA is ligated to control the bleeding ulcer, the arterial perfusion to the lower pancreatic head and the descending duodenum is completely preserved due to **retrograde blood flow** from the SMA via this inferior pancreaticoduodenal arcade.

(d) The greater curvature remains perfused by the left gastroepiploic artery (from the splenic artery), the proper hepatic artery remains perfused by its proximal segment, and the cystic artery typically originates from the right hepatic artery, making option B the correct pathophysiological evaluation.

Final Answer: Retrograde flow from the inferior pancreaticoduodenal artery via the SMA will maintain perfusion to the lower pancreatic head.

Answer: (B)

Go Back to Question 1

Q2.

Solution

Concept: The **gonadal vessels** (testicular arteries in males, ovarian arteries in females) are paired branches that arise directly from the anterolateral aspect of the abdominal aorta inferior to the origin of the renal arteries ($L2$ vertebra level). These long, slender vessels descend retroperitoneally, coursing obliquely across the anterior surface of the **psoas major muscle**.

Solution:

Let's isolate the structural anatomical relationships present on the anterior surface of the psoas major:

(a) The **genitofemoral nerve** pierces the fascia of the psoas major muscle and runs vertically along its anterior aspect.

(b) Medial to this nerve, the **testicular artery and vein** run downward to access the deep inguinal ring. The artery provides the principal blood supply to the testis and epididymis, while also giving off tiny twigs that supply the middle third of the retroperitoneal **ureter** as it crosses it.

(c) Accidentally dividing or clamping this small vascular bundle during a retroperitoneal lymph node dissection for a testicular germ cell tumor compromises the **arterial blood supply to the middle third of the ureter and deep testicular tissues**, making option C the correct clinical outcome. Option D describes a genitofemoral nerve injury, not a vascular injury.

Final Answer: Compromised arterial blood supply to the middle third of the ureter and deep testicular tissues.

Answer: (C)

Go Back to Question 2

Q3.

Solution

Concept: The **left recurrent laryngeal nerve** arises from the left vagus nerve ($CN\ X$) as it crosses the anterior surface of the aortic arch. It loops inferior to the arch of the aorta, passing immediately posterior and lateral to the **ligamentum arteriosum** (the fibrotic remnant of the embryological ductus arteriosus).

Solution:

Let's trace the path of the highlighted structure and its clinical significance:

(a) The schematic maps out the structural layout of the superior-posterior mediastinum, focusing on the aortic arch and the trachea.

(b) The highlighted nerve (**Structure X**) loops directly under the aortic arch from anterior to posterior, lateral to the ligamentum arteriosum, before ascending within the tracheoesophageal groove.

(c) This corresponds specifically to the **left recurrent laryngeal nerve**. A large vascular aneurysm involving the aortic arch or a dilated pulmonary trunk can compress this nerve against the rigid ligamentum or trachea, causing vocal cord paralysis that manifests clinically as dysphagia and hoarseness (Ortner's syndrome).

Final Answer: Left recurrent laryngeal nerve

Answer: (B)

Go Back to Question 3

Q4.

Solution

Concept: The rotator cuff consists of four muscles that stabilize the glenohumeral joint: supraspinatus, infraspinatus, teres minor, and subscapularis. These muscles have distinct insertions onto the proximal humerus landmarks.

Solution:

Let's evaluate the insertions of the rotator cuff muscles and their actions:

(a) The greater tubercle of the humerus serves as the insertion site for three of the rotator cuff muscles: the supraspinatus (superior facet), infraspinatus (middle facet), and teres minor (inferior facet).

(b) The **lesser tubercle of the humerus** serves as the unique insertion site for a single rotator cuff muscle: the **subscapularis muscle**.

(c) The subscapularis is the primary **internal (medial) rotator** of the glenohumeral joint. Therefore, an avulsion fracture of the lesser tubercle detaches the subscapularis tendon, leading to severe weakness during internal rotation against resistance.

Final Answer: $\boxed{\text{Subscapularis}}$

$\boxed{\textbf{Answer: (C)}}$

Go Back to Question 4

Q5.

Solution

Concept: The **popliteus muscle** has a unique intracapsular tendon that originates from the lateral femoral condyle. The tendon passes directly through the joint capsule of the knee, running between the **lateral meniscus** medially and the **fibular collateral ligament (FCL)** laterally, creating a distinct anatomical gap (the poplitieal hiatus).

Solution:

Let's evaluate the biomechanical function of the popliteus tendon:

(a) When the knee is fully extended, it is structurally "locked" in position by internal rotation of the femur on the tibia (when standing).

(b) To flex the knee, it must first be "unlocked." The **popliteus muscle** executes this critical biomechanical action by inducing **external (lateral) rotation of the femur on the fixed tibia** (or internal rotation of the tibia if the foot is non-weight-bearing).

(c) An isolated complete tear of this intracapsular tendon compromises this mechanism, impairing the initialization of knee flexion from a fully extended position.

Final Answer: Unlocking the extended knee joint by initiating external rotation of the femur on the fixed tibia.

Answer: (B)

Go Back to Question 5

Q6.

Solution

Concept: The contents of the popliteal fossa exhibit a highly specific, layered spatial relationship in both the vertical and horizontal planes. From deep (closest to the popliteal surface of the femur and the joint capsule floor) to superficial (closest to the popliteal fascia and skin), the principal neurovascular structures are arranged in a strict sequence.

Solution:

Let's identify the structures labeled along the deep-to-superficial alignment line:

(a) **Structure 1 (Deepest):** Located directly against the bony floor of the popliteal fossa. This is the **popliteal artery**. Because of its deep position, it is highly susceptible to entrapment or injury during supracondylar femoral fractures.

(b) **Structure 2 (Middle):** Crosses superficial to the artery within the fossa. This is the **popliteal vein**.

(c) **Structure 3 (Superficial):** Situated most superficially, right beneath the popliteal fascia and fat. This is the **tibial nerve**.

(d) Therefore, the correct deep-to-superficial sequence corresponding to labels 1, 2, and 3 is Popliteal artery → Popliteal vein → Tibial nerve.

Final Answer: $\boxed{\text{1: Popliteal artery; 2: Popliteal vein; 3: Tibial nerve}}$

$\boxed{\textbf{Answer: (B)}}$

Go Back to Question 6

Q7.

Solution

Concept: Hemiballismus is a hyperkinetic involuntary movement disorder characterized by wild, flinging movements of the contralateral limbs. It is caused by a lesion localized to the **subthalamic nucleus (STN)**, a small lens-shaped structure derived embryologically from the diencephalon and functioning as part of the basal ganglia circuit.

Solution:

Let's analyze the neuroanatomical pathway and projections of the subthalamic nucleus:

(a) In the indirect pathway of the basal ganglia, the subthalamic nucleus provides a **direct excitatory glutamatergic output** to the **globus pallidus internus (GPi)** and the substantia nigra pars reticulata (SNr).

(b) The GPi/SNr complex subsequently provides inhibitory GABAergic output to the thalamus, keeping unwanted motor activity suppressed.

(c) An ischemic infarct of the STN abolishes this excitatory driving force to the **globus pallidus internus**, resulting in under-excitation of the GPi, a subsequent loss of downstream thalamic inhibition, and the clinical manifestation of contralateral hemiballismus.

Final Answer: $\boxed{\text{Globus pallidus internus (GPi) via glutamatergic fibers}}$

Answer: (B)

Go Back to Question 7

Q8.

Solution

Concept: **Medial medullary syndrome** results from an occlusion of the anterior spinal artery or the paramedian branches of the basilar artery. It compromises three major structures in the medial medullary zone: the hypoglossal nerve fibers, the corticospinal tract, and the **medial lemniscus**.

Solution:

Let's identify the fiber tract responsible for the sensory deficits:

(a) The patient presents with ipsilateral paralysis of the tongue due to damage to the hypoglossal nerve ($CN\ XII$) nucleus or its exiting rootlets.

(b) The concomitant **contralateral loss of conscious proprioception, vibration, and discriminative touch** indicates damage to the posterior column-medial lemniscus pathway.

(c) In the medulla, the second-order neurons from the nucleus gracilis and cuneatus cross as internal arcuate fibers and ascend vertically as the **medial lemniscus**, situated immediately posterior to the pyramid and adjacent to the hypoglossal rootlets.

Final Answer: Medial lemniscus

Answer: (B)

Go Back to Question 8

Q9.

Solution

Concept: Hydrocephalus is categorized as communicating or non-communicating (obstructive). In non-communicating hydrocephalus, cerebrospinal fluid (CSF) flow is interrupted within the ventricular system, resulting in selective dilation of the ventricles located upstream of the obstruction.

Solution:

Let's localize the site of structural occlusion using the ventricular cast profile:

(a) The patient exhibits dilation of both lateral ventricles and the third ventricle, while the fourth ventricle remains normal in size. This indicates that CSF can enter the third ventricle but cannot pass normally into the fourth ventricle.

(b) However, look closely at the schematic diagram: the red obstruction marker is positioned precisely at the junction channel connecting the **lateral ventricle** to the **third ventricle**.

(c) This specific narrowing canal is the **interventricular foramen of Monro**. A bilateral or selective blockage at this specific key location isolates the lateral ventricles from the third ventricle, leading to upstream ventricular expansion.

Final Answer: $\boxed{\text{Interventricular foramina of Monro}}$

Answer: (C)

Go Back to Question 9

Q10.

Solution

Concept: The muscles of facial expression are innervated by the facial nerve ($CN\ VII$), which passes through the substance of the parotid gland. The muscles of mastication are innervated by the **mandibular division of the trigeminal nerve ($CN\ V_3$)**.

Solution:

Let's correlate the preserved and compromised functions to identify the injured nerve branch:

(a) The patient can close their eyes tightly (orbicularis oculi) and smile symmetrically (zygomaticus major, buccinator), confirming that the branches of the facial nerve ($CN\ VII$) are functionally fully intact post-parotidectomy.

(b) However, the inability to **protrude the jaw against resistance** indicates a complete motor deficit of the **lateral pterygoid muscle**, which is responsible for jaw protrusion and side-to-side translation.

(c) The lateral pterygoid is innervated by the **nerve to lateral pterygoid**, a motor branch of the **mandibular division of the trigeminal nerve ($CN\ V_3$)**. This deep pathway running near the infratemporal/parotid interface was inadvertently compromised during the deep tissue dissection.

Final Answer: $\boxed{\text{Mandibular division of CN V (via nerve to lateral pterygoid)}}$

$\boxed{\textbf{Answer: (B)}}$

Go Back to Question 10

Q11.

Solution

Concept: The superior laryngeal nerve branches into the external laryngeal nerve (motor to the cricothyroid muscle) and the **internal laryngeal nerve**. The internal laryngeal nerve is entirely **sensory** and pierces the thyrohyoid membrane alongside the superior laryngeal artery.

Solution:

Let's evaluate the functional deficits resulting from the isolation or injury of the internal laryngeal nerve:

(a) Because the internal laryngeal nerve carries no motor fibers, its transection does not cause vocal cord paralysis or cricothyroid muscle dysfunction (ruling out options A and D).

(b) It provides the principal **general visceral afferent (sensory) innervation** to the laryngeal mucosa **superior to the vocal folds** (the supraglottic space), including the laryngeal surface of the epiglottis.

(c) Loss of this sensory pathway abolishes the afferent limb of the **cough reflex** initiated by foreign material entering the upper larynx, significantly increasing the patient's risk of silent aspiration.

Final Answer: Loss of general sensation and cough reflex from the laryngeal mucosa superior to the vocal folds.

Answer: (B)

Go Back to Question 11

Q12.

Solution

Concept: The pterygopalatine fossa is a small, inverted-pyramid-shaped space located deep within the skull, acting as a major neurovascular distribution hub. It communicates with various cranial regions via several bony channels and foramina.

Solution:

Let's trace the connections of the pterygopalatine fossa shown in the diagram:

(a) The fossa connects anterior-superiorly to the orbit via the inferior orbital fissure, and medially to the nasal cavity via the sphenopalatine foramen.

(b) **Route Y** extends posteriorly from the pterygopalatine fossa to open directly into the **middle cranial fossa**.

(c) This specific osseous tunnel is the **foramen rotundum**, which transmits the **maxillary nerve ($CN\ V_2$)** from the middle cranial fossa into the pterygopalatine fossa. This pathway can serve as a conduit for infections or tumors to track into the intracranial space.

Final Answer: Foramen rotundum

Answer: (A)

Go Back to Question 12

Q13.

Solution

Concept: During embryonic development, the **urachus** is a fibrous remnant of the **allantois**, a canal that connects the dome of the developing bladder to the umbilicus. Normally, the lumen of the urachus obliterates completely before birth, forming the median umbilical ligament.

Solution:

Let's analyze the biochemical presentation to identify the patent embryonic channel:

(a) The infant has an anomalous clear, amber-colored fluid discharging from the umbilicus, exacerbated by crying (which increases intra-abdominal pressure).

(b) The presence of high concentrations of **urea and creatinine** confirms that this fluid is **urine**.

(c) This pathognomonic sign indicates a **patent urachus**, a condition resulting from a complete failure of luminal occlusion of the **allantois remnant**. A patent vitelline duct (option A) would discharge fecal matter or intestinal contents rather than urine.

Final Answer: Allantois (Urachus remnant)

Answer: (B)

Go Back to Question 13

Q14.

Solution

Concept: The **transposition of the great vessels (TGV)** is a life-threatening cyanotic congenital heart defect characterized by ventriculoarterial discordance, where the aorta arises from the right ventricle and the pulmonary trunk arises from the left ventricle.

Solution:

Let's identify the underlying embryological defect responsible for TGV:

(a) During normal cardiovascular development, neural crest cells migrate to coordinate the partition of the outflow tract.

(b) The **truncus arteriosus and conus cordis** must undergo a **180-degree spiral septation** mediated by the aorticopulmonary septum to properly align the aorta with the left ventricle and the pulmonary trunk with the right ventricle.

(c) A complete developmental failure or absence of this **spiral septation** results in a straight, non-spiral septum, causing the great vessels to switch their ventricular origins.

Final Answer: Spiral septation failure of the truncus arteriosus and conus cordis

Answer: (A)

Go Back to Question 14

Q15.

Solution

Concept: **Treacher Collins Syndrome** (mandibulofacial dysostosis) is an autosomal dominant disorder characterized by severe craniofacial anomalies. It is caused by mutations in genes like *TCOF1*, which disrupt ribosome biogenesis and lead to the apoptosis of **cranial neural crest cells**.

Solution:

Let's localize the defect to the correct pharyngeal arch highlighted in the diagram:

(a) Cranial neural crest cells migrate into the pharyngeal arches to form the skeletal and connective tissue components of the face.

(b) The clinical signs—mandibular hypoplasia, malformed zygomatic bones, and malformed external/middle ear structures—point directly to a failure within the **First Pharyngeal Arch (Meckel's Domain)**.

(c) The first pharyngeal arch gives rise to the mandible, maxilla, zygomatic bone, incus, and malleus, making it the primary site of anomalous neural crest arrest in this syndrome.

Final Answer: First Pharyngeal Arch

Answer: (A)

Go Back to Question 15

Q16.

Solution

Concept: The histological architecture of the human gastrointestinal tract varies across its segments. The presence of glands within the **submucosal layer** is an exceptional feature restricted to only two specific locations in the entire alimentary canal: the esophagus (mucus-secreting esophageal glands) and the **duodenum**.

Solution:

Let's identify the specific glands and region matching the functional profile:

(a) The biopsy demonstrates coiled, branched tubular glands localized **exclusively within the submucosal layer**. These are **Brunner's glands** (duodenal glands).

(b) Brunner's glands secrete a clear, viscous, highly alkaline fluid rich in **bicarbonate ions (HCO_3^-)** and glycoproteins.

(c) The primary physiological role of this alkaline secretion is to neutralize the highly acidic gastric chyme entering the duodenum from the pylorus, protecting the duodenal mucosa and optimizing the pH for pancreatic digestive enzymes. Thus, the specimen was retrieved from the **submucosa of the duodenum**.

Final Answer: $\boxed{\text{Submucosa of the Duodenum}}$

Answer: (C)

Go Back to Question 16

Q17.

Solution

Concept: The glomerular filtration barrier in the kidney is composed of three sequential structural layers: the fenestrated capillary endothelium, the glomerular basement membrane (GBM), and the epithelial layer consisting of visceral podocytes.

Solution:

Let's identify the component labeled **Structure Z** from the schematic:

(a) The schematic lays out the cross-sectional barrier from the capillary lumen side to Bowman's space.

(b) Layer 1 shows the fenestrated endothelium, and Layer 2 represents the thick, continuous glomerular basement membrane.

(c) **Structure Z** points directly to the interdigitating cellular extensions resting on the outer surface of the GBM. These are the **podocyte pedicels (foot processes)**.

(d) The narrow spaces between these adjacent pedicels form the **filtration slits**, which are spanned by a thin, specialized protein meshwork known as the slit diaphragm, acting as the final size-selective barrier against protein filtration.

Final Answer: Podocyte pedicels (foot processes)

Answer: (B)

Go Back to Question 17

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	B	2	C	3	B	4	C	5	B
6	B	7	B	8	B	9	C	10	B
11	B	12	A	13	B	14	A	15	A
16	C	17	B						