

STRUCTURAL BASIS OF MEDICAL PRACTICE
EXAMINATION 3

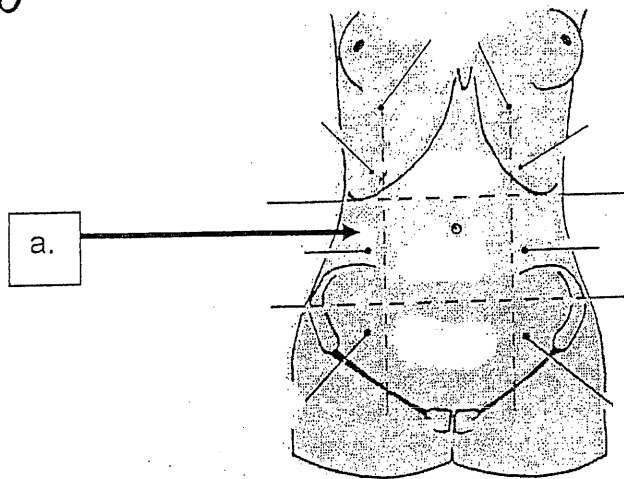
September 20, 2007

*Answered
1st Exam
Oct 2007*

PART I. Answer in the space provided. (5 pts)

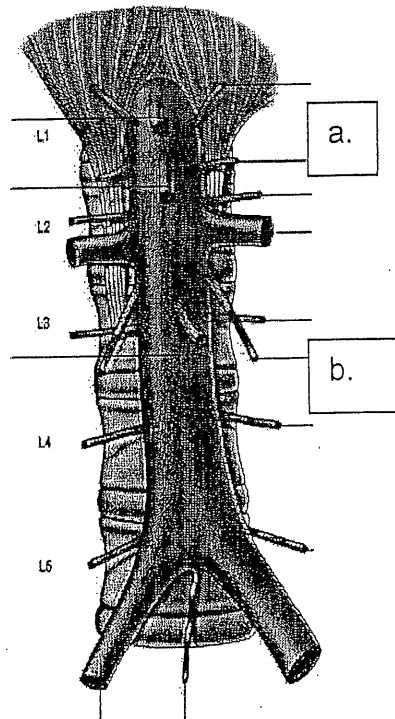
1. Identify the region. (0.5 pt)

a. Right Lumbar



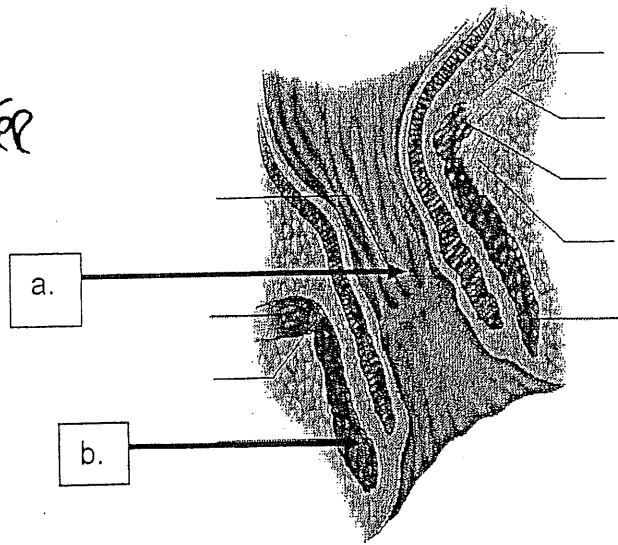
2. Identify the structures. (1 pt)

a. Middle Supracostal Artery
b. Common / Testicular / Ovarian Artery



3. Identify the structures. (1 pt)

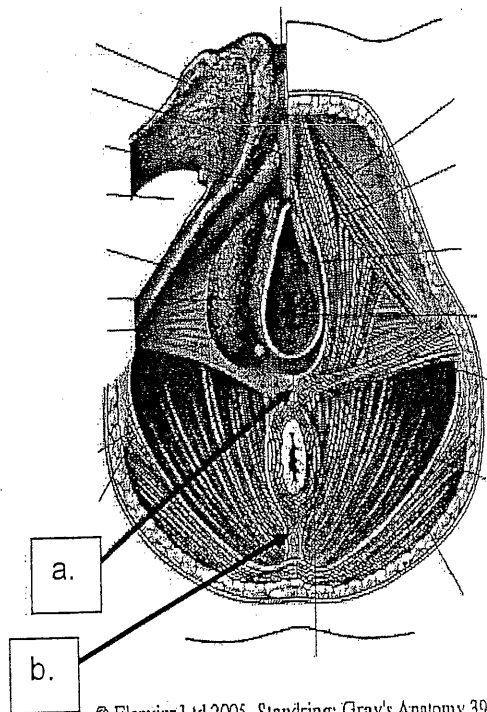
- a. Anal Columns
- b. External Anal Sphincter



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4. Identify the structures. (1 pt)

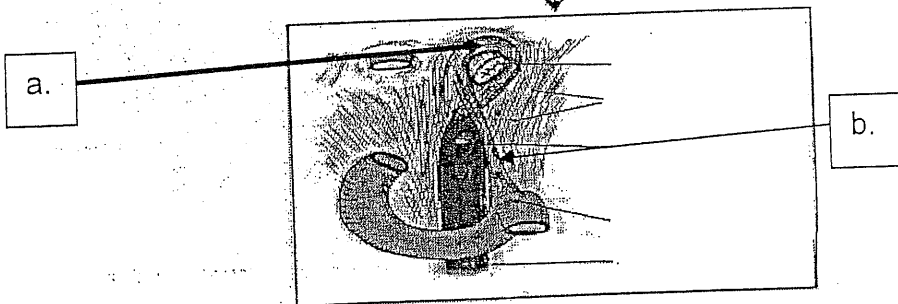
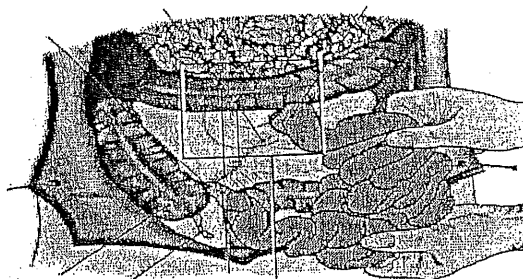
- a. Perineal Body / Central Tendon
- b. Anococcygeal Raphe



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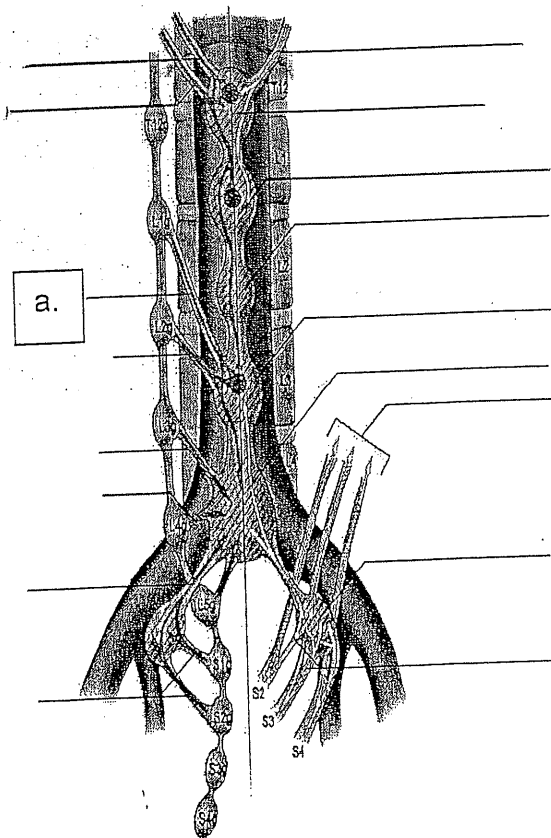
5. Identify the structures. (1 pt)

- a. Right Crus
- b. Ligament of Kretz/Suspensory
Ligament of Duodenum



6. Identify the structures. (0.5 pt)

- a. Lumbar Splanchnic



artery. It leaves pelvis via greater sciatic foramen to enter gluteal region. The short gluteal course loops posterior to ischial spine. Inferior to the spine the artery enters the ischioanal fossa via lesser sciatic foramen.

- Internal pudendal artery enters pudendal canal
 - osseofibrous canal formed by obturator internus fascia and falciform edge of ischial tuberosity
 - elaborates inferior rectal branch just before canal or from within canal
 - courses inferior, medial, and anterior through fatty tissue toward anorectal area
 - exits canal at posterior free edge of urogenital diaphragm within ischioanal fossa
- elaborates terminal branches
 - superficial perineal a. - posterior scrotal (labial)
 - deep perineal a. - pierces superficial perineal fascia to enter superficial pouch ○ to muscles of superficial and deep pouches
 - dorsal a. of the clitoris or penis
 - runs along conjoint ramus within anterior recess ischioanal fossa.
 - pierces transverse perineal ligament to enter onto dorsum of penis or clitoris
 - deep to Buck's fascia and superficial to tunica albuginea
 - resides lateral to deep dorsal vein and medial to dorsal nerve
 - other descriptions indicate a course through the superficial and deep pouches
 - both descriptions are verified on dissection
 - deep artery
 - travels partway along conjoint ramus within anterior recess of ischioanal fossa
 - pierces superior fascia of urogenital diaphragm to enter the deep pouch
 - pierces inferior fascia of urogenital diaphragm at tunica albuginea of crus
 - pierces crus to enter corpora cavernosum and course distally

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Pelvic Diaphragm

Discuss the anatomy of the pelvic diaphragm. Include structure, fascial coverings, spaces, vascularization, innervation, lymphatic drainage and relationships. (12 pts)

- Structure and fascial coverings of the pelvic diaphragm
 1. The pelvic diaphragm is a thin sheet of muscle. The urethra, vagina, and anal canal pass through the pelvic diaphragm at the urogenital hiatus. Posterior to the vagina and anterior to the anal canal, the urogenital hiatus is filled by the perineal body and the pubococcygeus muscle. The pelvic diaphragm functions in micturition and defecation by controlling intra-abdominal pressure and the anatomical properties of functional sphincters -- uvula and puborectal sling.
 2. The anterior aspect of the pelvic diaphragm is made up of the pubococcygeus, iliococcygeus, and the puborectalis. Collectively, these three muscles constitute the levator ani. Its lateral halves slope inferiorly medially from the arcus tendineus to meet at the midline of pelvic floor. The pubococcygeus and especially the iliococcygeus, upon contracting, raise the pelvic floor. These two muscles are tethered to the coccyx by the anococcygeal raphe and insert upon the lateral aspects of the urethra, prostate, vagina,

- and anal canal.
3. The puborectalis arises from the pubic bones near the superior aspect of the symphysis. It lies on the inferior surface of the pubococcygeus muscle. Posteriorly, the puborectalis muscle circles the anorectal junction. It is not tethered by the anococcygeal raphe. Thus, when contracted, the puborectalis pulls the rectum anterior and thereby promotes fecal continence.
 4. The posterior wall of the pelvic diaphragm is defined by the ischiococcygeus muscle. This muscle is not anatomically favored to directly elevate the pelvic and, thus, is not included as part of levator ani. However, the ischiococcygeus muscle, by virtue of its attachments to the ischial spine and the coccyx acts of approximate these two structures and indirectly assists in elevating the pelvic floor.
 5. The superior surface of the pelvic diaphragm is covered by parietal pelvic fascia. This fascia is continuous with the transversalis fascia of the abdominal cavity. The inferior surface of the pelvic diaphragm is covered by the inferior fascia. This fascia is continuous with deep fascia of the perineum.
- Relations of the pelvic diaphragm
 1. Superior - immediate is pelvic visceral fascia then the pelvic viscera and the abdominal cavity; retropubic space, presacral space, paravesical space, pubosacral ligamentous complex
 2. Inferior anterior - superior fascia urogenital diaphragm
 3. Inferior posterior - posterior recess of ischioanal fossa including fat, gluteus maximus, and perineal skin
 4. Lateral - arcus tendineus and obturator internus fascia (obturator nerve, external iliac artery and vein)
 5. anterior - superior aspect of the conjoint rami near pubic symphysis
 6. Posterior - piriformis muscle and sacrum (sacral plexus, sacral sympathetic trunk, middle sacral artery, effluents of sciatic foramina)
 - Vasculature of pelvic diaphragm
 1. The pelvic diaphragm receives arterial supply from the internal iliac. In particular, the inferior vesical arteries, the middle rectal arteries, the internal pudendal arteries, and the inferior rectal arteries all supply the pelvic diaphragm. Similarly, veins of the same name provide venous drainage.
 - Innervation of pelvic diaphragm
 1. The levator ani is innervated by the nerve to levator ani derived from S3-4. Additionally, the perineal surface of the levator ani receives innervation from inferior rectal branches of the pudendal nerve.
 2. The ischiococcygeus is supplied by the nerve to coccygeus derived from S4-5.
 - Lymphatic drainage of pelvic diaphragm
 1. Lymphatic drainage of pelvic diaphragm follows branches of the internal iliac artery to internal iliac nodes, then to upper lumbar nodes, lumbar lymph ducts, and the cisterna chyli. Other drainages include the sacral nodes and the common iliac nodes.
 2. Lymphatic drainage from inferior surfaces may be to the superficial inguinal lymph nodes.

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- inferior - duodenum
- right - opening into hepatorenal recess and right paracolic gutter
- left - lower recess of lesser sac
- Pathway of Materials?
 - Person rolls to the right - contents of lesser sac enter the greater sac via the epiploic foramen
 - Person returns to supine - contents enter the hepatorenal recess
 - Person stands - contents follow the right paracolic gutter to the pelvic basin and the rectouterine or rectovesical pouch
 - General discussion of abdominopelvic gutters
- Somatic afferent innervation
 - parietal peritoneum of the posterior wall innervated by thoracoabdominal nerves
- Why sharp pain?
 - Irritation of the parietal peritoneum of the posterior wall activates somatic afferent activity in the thoracoabdominal nerves (intercostals, subcostals, iliohypogastric, ilioinguinal) and possibly phrenic nerve.
- Vascular supply of the Walls - vascular supply is by regional aa and vv (optional)
 - posterior - splenic av
 - anterior - common hepatic, right gastric, left gastric, aa
 - inferior - right and left gastroepiploic aa vv, supra- and retroduodenal aa vv
 - superior - inferior phrenic av
 - left - short gastric aa vv
 - right - right and left gastric aa vv
- Lymphatic drainage of the Walls - follows vascular supply (optional)
 - paraaortic nodes to lumbar trunks to cysterna chyli
 - diaphragmatic border involves mediastinal and axillary nodes (anterior wall vasculature)
- Autonomic Innervation to the Walls (optional)
 - sympathetic preganglionics - mostly from greater and lesser splanchnic nerves (cell bodies in imlcc of T5-11)
 - sympathetic postganglionics - mostly from celiac plexus (cell bodies in celiac ganglion)
 - parasympathetic preganglionics - from vagus nerve (cell bodies in dorsal motor nucleus of vagus nerve)
 - parasympathetic postganglionics - intrinsic ganglia
- Visceral afferent innervation from the Walls (optional)
 - "pain" follows sympathetic pathways to spinal levels T5-11

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Course and Branches of the Internal Pudendal Artery

Discuss the course and branches of the internal pudendal artery in the pelvis, gluteal region, and perineum. Please include anatomical relationships of the artery, fascial layers involved, as well as spaces/recesses encountered by the internal pudendal artery and its branches. (12 pts)

- General Comments and Overview
 - The internal pudendal artery arises from within the pelvic and a branch of the internal iliac

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Written Examination Part IV. (36 pts) - Essay: Abdomen, Pelvis, and Perneum (September 20, 2007)

Lesser Sac (Omental Bursa)

Define the boundaries (including spaces and/or recesses) of the lesser sac including . Explain why damage to the stomach would produce sharp pains in the abdomen. Account for food particles also detected in the greater sac despite erosion of the posterior wall of the stomach. Discuss the pathway of materials that pass into the greater sac, and the location of these fluids/food contents with respect to body position. (12 pts)

- General comments
 - The lesser sac is a diverticulum in the superior region of the peritoneal cavity. Communication with the greater sac is via the epiploic foramen. For the most part, the lesser sac is posterior to the stomach and liver, anterior to the pancreas and diaphragm, superior to the duodenum, pancreas, and transverse mesocolon, inferior to the liver and diaphragm, left of the caudate, and right to the gastroleino and leinorenal lig.
- Superior recess - posterior to liver, begins at epiploic foramen
 - anterior - caudate lobe of liver and lesser omentum
 - posterior - diaphragm
 - superior - diaphragm
 - inferior - lesser recess
 - right - liver, ligamentum venosum
 - left - splenic recess
- Inferior recess - inferior of the right gastropancreatic fold (common hepatic a.)
 - anterior - hepatoduodenal ligament, duodenum, gastrocolic ligament
 - posterior - pancreas, tail of pancreas enters leinorenal ligament
 - superior - superior recess
 - inferior - transverse mesocolon
 - right - liver
 - left - gastroleino ligament
- Splenic recess - left of gastroepiploic fold (left gastric a.)
 - anterior - stomach, gastrocolic ligament (greater omentum)
 - posterior - aorta, left suprarenal gland, upper pole left kidney, splenic a., diaphragm
 - superior - liver and diaphragm
 - inferior - inferior recess
 - right - caudate lobe, superior recess
 - left - gastroleino and leinorenal ligaments
- Epiploic foramen - communication between lesser and greater sacs
 - anterior - hepatoduodenal ligament
 - posterior - inferior vena cava
 - superior - caudate lobe liver

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The external spermatic fascia is superficial to the cremasteric fascia and is the outer most tunic

- Derived from the external oblique, the external spermatic fascia extends to the cord beyond the superficial ring
- Within the scrotum the external spermatic fascia is deep to dartos tunic

Path of indirect inguinal hernia

- An indirect hernia follows the embryologic "descent" of the testis indirectly out the superficial ring by way of the deep ring.
- A patent processus vaginalis allows herniated material to pass through the deep ring lateral to the inferior epigastric artery
- Herniated material passes through the inguinal canal and out the superficial ring - superior and medial to pubic tubercle
- Distally, the hernia is arrested by the tunica vaginalis
- In the case of herniated intestine, visceral peritoneum is directly opposed to visceral and parietal tunica vaginalis
- Palpation of the hernia occurs at the anterior aspect of the testis within the scrotum
- The long and curvaceous path of an indirect hernia make strangulation a distinct possibility

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