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Anatomical regions of the abdomen

to the size of the abdominal pelvic cavity, it is separated into regions and quadrants. These divisions are listed below along with illustrations of them in Images 3 and 4. Take time to locate these in the images and be ready for recall in the lesson quiz. Image 3: Abdominopelvic Quadrants Abdominopelvic Quadrants: Right upper quadrant (RUQ) Left upper quadrant (LUQ) Right lower quadrant (RLQ) Left lower quadrant (LLQ) Image 4: Abdominopelvic Regions Abdominopelvic Regions: Umbilical region- center-most region (belly button) Epigastric region- superior to the umbilical region (above belly) Hypogastric region- inferior to the umbilical region (pubic area) Right iliac (inguinal region)-located lateral to the hypogastric region Left iliac (inguinal region)-located lateral to the hypogastric region Right lumbar region- lateral to the umbilical region Left lumbar region- lateral to the umbilical region Right hypochondriac region- lateral to the epigastric region Left hypochondriac region- lateral to the epigastric region Note the specific quadrants and regions each of the following organs of the body are found: stomach- epigastric region and the LUQ heart- epigastric region and RUQ/LUQ liver- right hypochondriac/epigastric regions and RUQ bladder- hypogastric region and RLQ/LUQ intestines- multiple regions and quadrants Check for understanding: "Can you name the organs of the digestive system and the regions and quadrants they are found in?" The answer is: The digestive system organs are the mouth, pharynx, esophagus, stomach, small intestine, large intestine, rectum, and anal canal. The mouth, pharynx, esophagus, and stomach are found in the epigastric region. The small intestine is found in the epigastric, umbilical, and right hypochondriac regions. The large intestine is found in the right hypochondriac, epigastric, umbilical, and left hypochondriac regions. The rectum and anal canal are found in the hypogastric region. The other three organs of the digestive system are the liver, gallbladder, pancreas, the first three parts of the duodenum, head of the pancreas, rt. suprarenal (adrenal) gland, rt. kidney, rt. colic (hepatic) flexure, sup. part of ascending colon, lt. half of transverse colon Left Upper Quadrant Lt. lobe of liver, spleen, most of stomach, jejunum and proximal ileum, body and tail of pancreas, lt. suprarenal (adrenal) gland, lt. kidney, lt. colic (splenic) flexure, sup. part of descending colon Right Lower Quadrant cecum, appendix, most of ileum, inf. part of ascending colon, rt. ovary, rt. uterine tube, rt. ureter, rt. spermatic cord Left Lower Quadrant sigmoid colon, inf. part of descending colon, lt. ovary, lt. uterine tube, lt. ureter, lt. spermatic cord The other way is to draw four lines. Two are horizontal, one at the lower rib margins and the other passing through the iliac tubercles. The other two are vertical, passing through the middle of each clavicle. The result is nine regions: the right hypochondriac region, epigastric region, left hypochondriac region, right lumbar region, umbilical region, left lumbar region, right inguinal region, hypogastric region, and the left inguinal region. Do not worry about knowing the exact contents of each specific region, although a general idea, along with some clinical information, is given in #7 below. (In Greek, chondros = cartilage, so hypochondriac = under cartilage. Epigastric is "upon the stomach", while hypogastric is "under the stomach". In Latin, inguinalis = groin.) This illustration offers a different view of the ones above: Images from "Anatomy of the Human Body" by Henry Gray are provided by: The rectus sheath is formed by the interweaving of the aponeuroses of the external oblique, internal oblique, and transversus abdominis muscles. It encloses the rectus abdominis and pyramidalis muscles (only present 80% of the time- see Image 2). The aponeurosis of the external oblique muscle is the most superficial layer of the rectus sheath. The aponeurosis of the internal oblique muscle is the middle layer. The aponeurosis of the transversus abdominis muscle is the deepest layer. The posterior layer (lamina) is composed of fibers from the transversus abdominis aponeurosis and the internal abdominal oblique aponeurosis. (Thin eye does not deceive thee- the internal abdominal oblique aponeurosis splits into two parts, one contributing to the anterior and the other contributing to the posterior layers of the sheath.) The inferior part is deficient posteriorly because all three aponeuroses contribute to the anterior layer of the sheath. The only thing left on the posterior aspect of the rectus abdominis muscle, then, is the thin transversalis fascia. The fibers all meet in the middle and interweave at the linea alba. For more than you ever wanted to know about anatomical variation, the University of Iowa has a great site, an "Illustrated Encyclopedia of Human Anatomic Variation". Here is a quick and dirty link to the section on muscles of the abdominal wall, (including the pyramidalis). The anterior portion and the lateral portion of the abdominal wall are often considered together (anterolateral) because the muscles are functionally similar, and are functionally different than those of the posterior aspect. Lateral: from superficial to deep: skin, fatty layer of superficial fascia (Camper's fascia), membranous layer of superficial fascia (Scarpa's fascia), deep fascia, external abdominal oblique muscle, deep fascia, internal abdominal oblique muscle, deep fascia, transversus abdominis muscle, transversalis fascia, extraperitoneal fat, parietal peritoneum Anterior (superior to arcuate line): from superficial to deep: skin, fatty layer of superficial fascia, membranous layer of superficial fascia, deep fascia, external abdominal oblique aponeurosis*, anterior layer of internal abdominal oblique aponeurosis*, rectus abdominis, posterior layer of internal abdominal oblique aponeurosis*, transversus abdominis aponeurosis*, transversalis fascia, extraperitoneal fat, parietal peritoneum Anterior (inferior to arcuate line): from superficial to deep: skin, fatty layer of superficial fascia, membranous layer of superficial fascia, deep fascia, external abdominal oblique aponeurosis*, rectus abdominis, posterior layer of internal abdominal oblique aponeurosis*, transversus abdominis aponeurosis*, transversalis fascia, extraperitoneal fat, parietal peritoneum Posterior (superior to arcuate line): from superficial to deep: skin, fatty layer of superficial fascia, membranous layer of superficial fascia, deep fascia, external abdominal oblique aponeurosis*, rectus abdominis, posterior layer of internal abdominal oblique aponeurosis*, transversus abdominis aponeurosis*, transversalis fascia, extraperitoneal fat, parietal peritoneum Posterior (inferior to arcuate line): from superficial to deep: skin, fatty layer of superficial fascia, membranous layer of superficial fascia, deep fascia, external abdominal oblique aponeurosis*, rectus abdominis, posterior layer of internal abdominal oblique aponeurosis*, transversus abdominis aponeurosis*, transversalis fascia, extraperitoneal fat, parietal peritoneum The superficial inguinal ring is a passageway through the abdominal wall, formed by a gap in the external abdominal oblique muscle. It is located just superior and lateral to the pubic tubercle. Its components are as follows: Lateral crural: inferior margin of ring, blending with inguinal ligament towards its insertion. Medial crural: superior and medial boundary of superficial inguinal ring. Intercutaneous fibers: superolateral margin of superficial inguinal ring. 16. Consider the sources and extent of distribution of the ilioinguinal nerve. (N 257, 258, 497, 504, 508-511, 511-512) Source: L1 (Lumbar plexus) Terminal ends: Anterior scrotal/labial nerves Distribution: Distributes through the inguinal canal and superficial inguinal ring to the skin below the inguinal ligament and to the skin over the scrotum/labia majora. 17. What does the superficial inguinal ring transmit in the female? In the male? (TG 5-08A, 5-09A) Both: ilioinguinal nerve (Female: round ligament of the uterus Male: spermatic cord, covered by cremaster muscle and fascia, and internal spermatic fascia 18. How do you differentiate the external abdominal oblique from the internal abdominal oblique? (N 249, 250, 504, 508-511, 511-512) The fibers of the external abdominal oblique originate on the lower ribs, running inferomedially towards the linea alba (like hands in your pockets). This is the same direction as the external intercostal muscles. The fibers of the internal abdominal oblique originate more laterally, on the iliac crest and thoracolumbar fascia, and run superomedially, like the internal intercostals. 19. Where do the iliohypogastric and ilioinguinal nerves pierce the internal and external abdominal oblique muscles? To where do they distribute? (N 267, 504-505, 508-511) Both nerves begin their journey between the internal abdominal oblique and transversus abdominis muscles, but at the anterior superior iliac spine they jump out a layer and lie between the external abdominal oblique aponeurosis and the internal abdominal oblique muscle. Both nerves supply the skin and muscles of the anterior abdominal wall. The iliohypogastric nerve pierces the external abdominal oblique muscle and the ilioinguinal nerve pierces the internal abdominal oblique muscle. In the female, it is very small and does not pass through the superficial ring. 21. Note also that the segmental nerves and vessels are in the "plane of separation", between the internal abdominal oblique and the transversus abdominis muscle, that you are now attempting to open. How do the hypogastric and ilioinguinal nerves differ in this respect? (N 257, 258, 504-505, 508-511, 511-512) See question 17 above. 22. Find the segmental vessels and nerves on the surface of the transversus abdominis muscle and consider their level, origin, areas of distribution, oblique orientation, and the manner in which they enter the rectus sheath. (N 257, 258, TG 4-08) See the discussion of anterior and lateral cutaneous nerves above. They are oblique because they roughly follow the oblique curves of the ribs. They penetrate the posterior lateral portion of the rectus sheath, passing behind the rectus abdominis, then they penetrate the rectus and the anterior layer to the sheath to end in the skin and subcutaneous tissue. 23. Locate superior and inferior epigastric arteries. What are their sources? Do they anastomose? (N 190, 255, 262, TG 5-05) The superior epigastric artery comes from internal thoracic artery (the other branch of the internal thoracic is the musculophrenic artery). The inferior epigastric artery comes from external iliac artery. They run inside the rectus sheath, and yes, they anastomose. 24. At what level (relative to the umbilicus) do you find the arcuate line? Is it distinct? (N 255, TG 5-05, 5-07) The arcuate line is a transverse line halfway between umbilicus and pubic symphysis. It is usually distinct, but occasionally it is a gradual transition. What tissue is left on the posterior side of the rectus muscle caudal to this line? (N 252, TG 5-05, 5-07) Only the transversalis fascia, extraperitoneal connective tissue and peritoneum are left. 26. Note the covering of the external abdominal oblique muscle. What is the difference between the superficial and deep fascia? (N 257, 258, 504-505, 508-511, 511-512) The superficial fascia is Camper's fascia, and the deep fascia is Scarpa's fascia. Camper's fascia is the superficial layer of the superficial fascia, and Scarpa's fascia is the deep layer. The superficial fascia is continuous with the superficial fascia of the lumbar region. From there, they descend through extraperitoneal connective tissue, through the inguinal canal, and into the scrotum behind an extension of the peritoneal cavity called the processus vaginalis. The gubernaculum (fibrous tissue band) helps to pull the testes down into the scrotum through the inguinal canal. In adult life, the gubernaculum will become the scrotal ligament. The female case is similar, but the uterus develops within the pelvis and the gubernaculum fuses to its side, interrupting the descent of the ovary just below the pelvic brim. The gubernaculum ends up as a ligament from ovary to uterus (proper ovarian ligament) and a ligament called the round ligament of the uterus which passes from the uterus through the deep inguinal ring, the inguinal canal, and the superficial inguinal ring to the labia majora. Keep in mind that the descent of the testis involves an evagination of the abdominal wall and that this is where the inguinal canal starts (deep ring), this is also how the spermatic cord gets its layers from the layers of the abdominal wall. The peritoneum initially evaginates through the abdominal wall parallel to the round ligament (female) or spermatic cord (male) before birth. This normally closes but if it remains open it constitutes a congenital inguinal hernia. 28. What does the small genital branch of the genitofemoral nerve innervate? The small genital branch of the genitofemoral nerve innervates the cremaster muscle. It also anastomoses with the anterior scrotal/labial nerve (from the ilioinguinal nerve) to supply the skin of the area. 29. Does the weak fascia between the falx inguinalis and inguinal ligament have a thickened lateral border (an interfoveolar ligament)? This depends on your cadaver. (Netter's 257, 258, 504-505 shows it from an internal view. 30. What tissue forms the deep (internal) inguinal ring, and how does it do so? The deep inguinal ring is formed by transversalis fascia above the midpoint of the inguinal ligament. It is not really a ring-like, but is more of a sleeve. 31. What passes through the deep ring? (N 252, 258, 504-505, 508-511, 511-512) The ilioinguinal nerve and the round ligament of the uterus (female) or spermatic cord (male) pass through the deep ring. 32. What is the difference between the superficial and deep inguinal rings? (N 257, 258, 504-505, 508-511, 511-512) The superficial inguinal ring is a passageway through the abdominal wall, formed by a gap in the external abdominal oblique muscle. It is located just superior and lateral to the pubic tubercle. Its components are as follows: Lateral crural: inferior margin of ring, blending with inguinal ligament towards its insertion. Medial crural: superior and medial boundary of superficial inguinal ring. Intercutaneous fibers: superolateral margin of superficial inguinal ring. 33. Define the inguinal triangle. (N 251, TG 5-07, 5-07) This is the weak area defined by the lateral border of rectus abdominis muscle, the inferior epigastric artery, and the inguinal ligament. 34. What is the relationship between the direct and indirect inguinal hernias and the falx inguinalis, weak fascia, deep and superficial inguinal rings, inguinal canal, and inguinal ligament? (N 251, TG 5-07, 5-07, 5-09, 5-11A, 5-11B, 5-11C) OK... here we go AGAIN! (Are you getting the impression that this is something you should know?) Direct inguinal hernias pass through the inguinal triangle (see #2, #10, and #11), which is an area of weak fascia. They almost never go into the scrotum. Both the superficial inguinal ring and the inherent weakness of abdominal wall lateral to the falx inguinalis make this area susceptible to hernias. Indirect inguinal hernias start at deep inguinal ring, pass down inguinal canal, through superficial ring, and, in the male, usually descend into scrotum along with the spermatic cord. In the female they travel along the round ligament. 35. Define the inguinal canal, noting location, orientation, rings, walls, shape, and relationships. See above. 36. How are the coverings of the spermatic cord represented in the scrotum? (N 370, TG 5-05, 5-06, 5-07, 5-08, 5-09) The spermatic cord is covered by the

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