



Abdominal Anatomy in Pregnant Women

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ABSTRACT

One of the most obvious differences between the anatomy of the abdomen of women and men is the absence of ovaries and, of course, the uterus in the body system of men. An interesting thing that happens during women's pregnancy is the change in the shape and size of the belly. This change in the size of the abdomen and its stretching is done in order to accommodate the fetus in the uterine and abdominal space. In fact, the longer the pregnancy is, the bigger the mother's belly is until the fetus has enough room to grow. If you look at the photo of the inside of a woman's abdomen, you can notice the change in the size of the uterus and its growth from the very first days of pregnancy, but in terms of appearance, this bulge can be seen from the second trimester of pregnancy. Is it your dream to have a flat and muscular stomach? This demand is not far away. Of course, in order to achieve that, in addition to exercise, you also need a proper diet. When we talk about the anatomy of the abdomen in bodybuilding, we mean knowing the exact location of the abdominal muscles. Abdominal muscles include the rectus abdominis, external oblique, internal oblique and oblique abdominal muscles.

Introduction

These muscles start from the fifth bone of the chest and continue to the lower abdomen, in addition to stretching along the upper body [1]. The strands of this section are placed side by side in a parallel way. These muscles play a big role in forming a flat stomach. The external oblique muscles are spread between the 5th and 12th thoracic bones and are attached to a ligament near the hip bone. Turning around, bending and rotating the hips is the responsibility of this muscle group [2].

Internal oblique muscles

The internal oblique muscles are located just below the external oblique muscles. This muscle group plays a role in controlling the abdomen and performing bent over movements. In addition, they are also involved in body rotation [3].

Location of abdominal organs

Next, we check the location of each organ:

Anatomy of the right abdomen

- Upper right quarter: Right lobe liver, gall bladder, duodenum, and head of pancreas, right kidney, and hepatic flexure of colon [4];
- Lower right quarter: Cecum, ascending colon, appendix, small intestine, right ovary, tubes;
- Upper left quarter: Spleen, left lobe liver, stomach, end and trunk of pancreas, left kidney, splenic flexure of colon
- Left lower quarter: Sigmoid colon, descending colon, small intestine, left ovary and tubes related to the sex organs

In vertebrates, the abdomen includes some organs such as the digestive system, urinary system, and muscles [5].

Abdominal oblique muscles

Abdominal oblique muscles horizontally cover the middle of the upper body. So that they make a protective net for the upper body. The upper body needs these muscles for stability.

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Treatment of anterior abdominal wall pain with anterior cutaneous nerve block

Under the skin, there is a layer called fascia, which is placed between the skin and the muscles. Anterior cutaneous nerve originates from the intercostal nerve and comes to the skin from inside the abdominal fascia and gives branches under the skin that are responsible for innervating these areas [6].

Anterior cutaneous denervation syndrome consists of the following set of symptoms

- Severe stabbing pain in the anterior abdominal wall;
- Pain when touching a part of the skin where the anterior cutaneous nerve is disturbed [7].

The pain spreads to the midline, but in most cases it does not reach the opposite side of the abdomen.

The main location of pain in this syndrome

Anterior cutaneous nerve cut syndrome mostly occurs in young women. In most cases, he can point to the location of the pain with his finger, which is right next to the rectus abdominis muscles. It is at this point that the intercostal nerve turns forward to become the anterior cutaneous nerve and reach under the skin [8-10]. On the way of this nerve coming forward from inside the abdominal fascia, this nerve passes through a fibrous ring, which is the place of disturbance. The nerve comes to the skin along with an artery and a vein from inside the abdominal fascia. A small amount of abdominal fat or abdominal viscera may pass through this fibrous ring and cause more pressure on the anterior cutaneous nerve and its further interruption. Abdominal muscle contraction causes more pressure on the nerve, which results in sudden and sharp pain in the area innervated by the anterior cutaneous nerve.

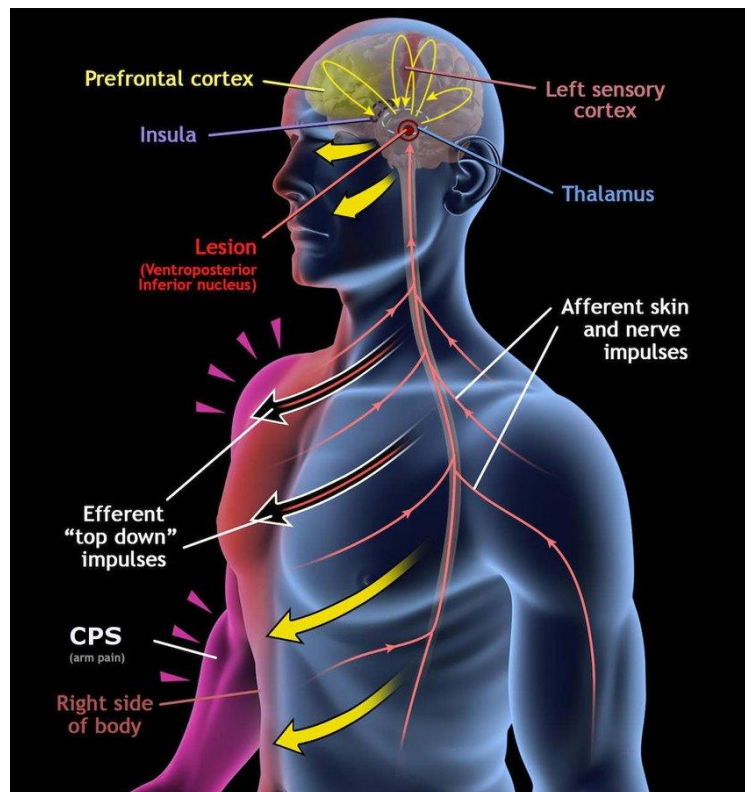


Figure 1. Default Space Theory of Central Pain Syndrome

Diagnosis

Physical examination shows that the patient is trying to reduce the pressure on the nerve by bending the lumbar and thoracic spine. With pressure on the involved anterior cutaneous nerve, exactly at the outer border of the rectus abdominis muscles, the patient's pain increases. Also, if the patient is asked to do some sit-stand up movements, the pain will increase. Radiography is mandatory for all patients who have pain in this area to confirm the absence of bone and cartilage diseases of the ribs, such as

fractures and tumors. Based on the patient's history and the doctor's diagnosis, other tests such as a complete blood cell count are also performed. If the doctor suspects intra-abdominal diseases or tumors, abdominal tomography is mandatory [11-13].

How to block

Injections for nerve block (interrupting the passage of nerve messages using anesthetics) are generally done in two ways. The first method is to use body surface landmarks to find the injection site, and the

second method is to use imaging devices (among these methods, ultrasound is the most effective and has the least side effects). In the landmark method, due to the lack of vision and full knowledge of the details inside the body, the possibility of errors and side effects is high, and these problems can be easily solved by using the ultrasound method [14-16].

Injection with the help of an ultrasound machine

To perform this block, the patient lies on his back on the examination bed. By placing the ultrasound probe on the injection site, the doctor identifies the internal structures and performs the injection. This injection has both therapeutic and diagnostic aspects [17].

Possible side effects

The most likely complication of this injection is pneumothorax (a type of respiratory disorder) that occurs due to a mistake in determining the injection site. It is also possible to damage the contents of the stomach by inserting too much of the needle. It is possible to reduce the possibility of these two complications by using an ultrasound machine and seeing the internal structures. In rare cases, infection may also occur, which can be prevented with appropriate sterile methods. It should be noted that due to anesthetizing the nerve, the patient may temporarily feel drowsy in the chest and abdomen. Also, the muscles below the chest will be temporarily weakened to some extent because the nerve that sends messages to these muscles is blocked [18-20].

Abdominal wall

Blood supply to the abdominal wall is carried out by superficial and deep arteries. Superficial arteries are located in the subcutaneous tissue. In the lower part of the abdomen there are superficial epigastric arteries (a. epigastrica superficialis) that go to the navel, superficial artery, circumflexa ilium superficialis, going to the iliac bank, arteries of the external genital system (aa. pudendae to the outside) external genitalia, inguinal branches (rr. inguinales), located in the inguinal region. The mentioned arteries are branches of the femoral artery (a. femoralis) [21].

In the upper part of the abdomen, the superficial arteries are small and the anterior branches of the inter costal and lumbar arteries. The deep arteries are the superior and inferior epigastric arteries and the deep arteries that surround the ileum. The superior epigastric artery (a. epigastrica superior) originates from the internal chest (a. thoracica interna). Going down into the sheath of the rectus abdominis, it penetrates the muscle, passes behind the muscle and connects with the inferior artery of the same name in the umbilical region.

The inferior epigastric artery is a branch of the external iliac artery. It rises between the transversalis fascia in front and the parietal peritoneum in the back, forms the folds of the lateral umbilical cord and enters the sheath of the rectus abdominis muscle [22].

On the dorsal surface of the muscle, the artery rises and joins the superior epigastric artery at the navel. The inferior epigastric artery supplies the artery to the muscle that raises the testicle (a. cremasterica). The deep artery that bends around the ilium (a. circumflexa ilium profunda) is often a branch of a. iliaca externa and parallel to the inguinal ligament in the tissue between the peritoneum and transverse fascia is directed towards the iliac crest. The five lower intercostal arteries (a. intercostales posteriores), which arise from the thoracic part of the aorta, go diagonally from top to bottom and medially between the internal and transverse abdominal muscles and connect to the branches of the superior epigastric artery [23-25].

The anterior branches of the four lumbar arteries (aa. lumbales) from the abdominal aorta are also placed between these muscles and run parallel to each other in the transverse direction, parallel to each other and participate in blood supply to the lumbar region. They connect to the branches of the inferior epigastric artery [26].

The veins of the abdominal walls are also divided into superficial and deep. Superficial veins are better than deep arteries and veins and form a dense network in the fat layer of the abdominal wall, especially in the navel area. They are connected with each other and with deep veins. Through the epigastric chest veins (vv. thoracoepigastricae), which flows into the axillary vein, and the superficial epigastric vein (v. epigastrica superficialis), which opens into the femoral vein, the superior and inferior vaginal venous systems connect to each other. are connected (sturgeon anastomosis). The veins of the anterior abdominal wall using VV. paraumbilicales, which is 4/5 located in the perihepatic ligament and flows into the portal vein, connect v. portae with v. Cattle (port anastomoses) [27].

The deep veins of the abdominal wall (vv. Epigastricae superiores et inferiores, vv. Intercostales and vv. Lumbales) (sometimes two) accompany the arteries of the same name. Lumbar veins are the origin of the formation of vertical ascending veins, which continue into the azgus and semi-unpaired veins.

Lymphatic drainage is done through the lymphatic vessels located in the surface layers of the anterior-lateral abdominal wall and flows from the upper parts to the armpits (lnn. axillares), from the bottom to the superficial inguinal lymph nodes (lnn. inguinales superficiales). Deep lymphatic vessels from the upper parts of the abdominal wall to the lymphatic layers between the intercostal (lnn.

intercostales), epigastric (Inn. epigastrici) and mediastinal (Inn. mediastinales) layers, from below into the iliac (Inn. iliointercostales), waist (Inn. lumbales) inguinal and deep lymphatic glands (Inn. inguinales profundi) superficial and deep drainage lymphatic vessels are connected [28].

Among the mentioned groups of lymph nodes, the lymph collects in the lumbar trunks (trunci lumbales) and enters the thoracic duct. The innervation of the anterior abdominal wall is carried out by the branches of six (or five) nerves between the lower cortex (subcostal), iliohypogastric (n. iliohypogastricus) and ilio-inguinal (n. ilioinguinalis) nerves. The anterior branches of the inter cortical nerves, together with the vessels of the same name, are placed parallel from top to bottom and anteriorly between the massage. Obliquus internus abdominis and m. Transverse and internalize them. Then they pierce the sheath of the rectus muscle, reach the posterior surface and branch there. The ilio-hypogastric and ilio-inguinal nerves are branches of the lumbar plexus. The ilio-hypogastric nerve appears in the thickness of the anterior abdominal wall 2 cm above the anterior

superior iliac spine. In addition, it runs diagonally downward between the internal and transverse oblique muscles, giving rise to branches and branches in the groin and groin area. N. ilioinguinalis is located in the inguinal canal parallel to the previous nerve above the inguinal ligament and exits through the superficial inguinal ring under the skin and finds a branch in the foreskin or labia major [29].

The anterior abdominal wall throughout, except for the white line, has the following layers: Skin, subcutaneous fat, fascia, muscles, pre peritoneal tissue and peritoneum. There are no muscles in the white line area. The thickness of subcutaneous fat is 3-10 cm or more. Between its upper layer in the vicinity of the skin and the lower layer, the aponeurosis has a somatic leaf. In some cases, it is thickened and resembles a muscular aponeurosis. With a medium longitudinal section, which is mostly used in obstetrics and gynecology, the skin, subcutaneous fat, aponeurosis of the abdominal muscles along the white line, trans versus abdominis fascia, pre peritoneal and peritoneum tissue are separated [30].

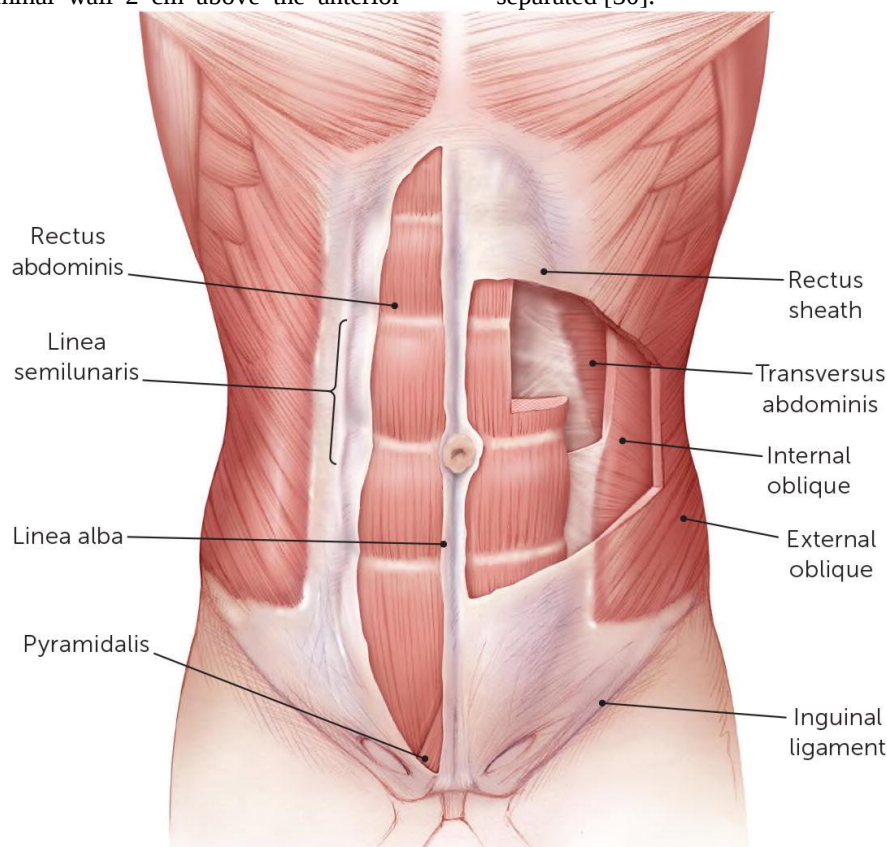


Figure 2. Abdominal Wall Pain: Clinical Evaluation, Differential Diagnosis, and Treatment

When releasing the fascia apenhorosis next to the white line, the vagina of one of the recti abdominis muscles is opened, which close each other towards the adjacent branch and diverge somewhat (20 to 20 mm) in the navel. The pyramidal muscles near the colon are higher than the rectus muscles, which are

easily separated from the midline. It is important to remember that the cut is made completely along the white line without damaging the muscles. After thinning of the rectus muscles in the lower part of the cut, the pre peritoneal tissue is visible, because here there is no posterior leaf of the sheath of the rectus muscles, and the transverse fascia along the

midline is not pronounced and is not always found. The posterior vaginal wall of the rectus muscles is well defined above the umbilicus and 4-5 cm below it, and is located in a semicircular line that ends in an upward protrusion, and below this line a narrow transverse fascia [31].

The incision of the pre peritoneal tissue is carefully made, its edges are divided to the sides, after which the peritoneal part is exposed and separated. Near the chest, when the abdominal cavity is opened, the risk of injury to the bladder increases, which is accompanied by bleeding, because in this place the fiber is firmly attached to the peritoneum. Therefore, separation of pre peritoneal tissue and peritoneum should start closer to the navel and everything should be done only under eye control. Above the semicircular line, the transverse slope is directly connected to the peritoneal part. So they are disconnected at the same time. In the upper edge of the chest, in the process of tearing, the skin tissue (Retzii cavity) is opened, which communicates with the pre peritoneal tissue of the anterior abdominal wall [32].

It is important to remember that when introducing mirrors, they are not placed between the peritoneum and the abdominal wall, because a cavity can form here and reach the bladder neck. Due to the fusion of the transverse fascia with the peritoneum, when the latter is sutured, its tension often occurs in the navel, which is not observed in the middle and lower parts of the wound.

Often there is a need to increase the incision upwards, above the navel. Therefore, you should remember some of its features. From the inner surface of the abdominal wall, the umbilical arteries, veins and urachus can be seen in the navel. They are usually growing and appear as bands of connective tissue. Arteries are formed in two forms: Lig. vesicalia lateralis, urachus - lig. vesicale middle and umbilical vein - lig. tereshepatis. In order not to damage the hepatic ligament and blood vessels, the incision should be extended, bypassing the umbilicus on the left side [33].

Orakus is passable. Therefore, when cutting the abdominal wall, it is better not to damage it, and if there is a gap, bandage it, especially the lower part. In the area of the suprapubic fold, the thickness of the subcutaneous fat layer is much thinner (than in the upper parts). Therefore, this area is chosen for the transverse incision of the abdominal wall (according to Pfannenstil), and this allows one of the indications to include the excessive development of the subcutaneous fat layer in women.

In obstetrics and gynecology, there are situations that require surgical interventions in the area of inguinal or femoral canals (shortening of the round ligaments with extra-splenic access, removal of gonads in Morris syndrome, etc.) [34].

Through the inguinal canal of women, the round ligament, its artery, ilio-inguinal and external

spermatic nerves pass. The walls of the inguinal canal are: In front - the aponeurosis of the muscle of the external fluid of the abdomen and fibers of the internal fluid back - transverse fascia; Upper - lower edge of the transverse abdominis muscle. From below, in the form of a groove, the inguinal ligament arises from fibers bent backwards and upwards. The inguinal canal has an internal and external inguinal ring, the distance between which (channel length) is 5 cm [35].

The internal inguinal opening with a diameter of 1.0-1.5 cm is located on the posterior surface of the anterior abdominal wall in the form of a depression from the cavity 1.0-1.5 cm above the middle of the inguinal ligament, it is located behind the birth pelvis, which runs from the middle of the inguinal ligament, covers the deep artery. Epigastric (arteria gastrica profunda). A distal ligament passes through the inner loop of the intra corporeal canal and pulls the transverse fascia with it. When pulling the distal ligament, along with the transverse fascia, the peritoneum is pulled out from the area of the inner ring of the inguinal canal in the form of a suction protrusion, which is called the processus vaginalis peritonei.

With an incision in the area of the inguinal canal, there is a risk when doing it below the inguinal ligament (better to do it above). Below it is the base of the femur triangle, which is bounded medially by the lacunar ligament and laterally by the iliocscapular ligament, which is a compressed area of the iliac fascia. It divides the whole space between the inguinal ligament, the ilium and the blood bones into two parts: A large muscle and a small vascular lacuna. m.iliopsoas, n. femoralis and n. cutaneus femoris lateralis pass through the muscle tube and the femoral vessels (artery and vein) with the lumbar-inguinal nerve pass through the vascular tube.

The femoral veins only cover the outer two-thirds of the vascular lacuna, and the inner third, which is located between the femoral vein and the lacunar ligament, is called the inner ring of the femur.

It is filled with adipose tissue, lymphatic vessels and lymph nodes. The inner ring of the femur with a diameter of 1.5-1.8 cm is formed from the front by the inguinal ligament, at the back by the ilio-pubic ligament and the spiral fascia starting from it, internally by the lacunar ligament and externally by the sheath of the femoral vein. The inner ring of the femur from the perinatal side corresponds to an oval fossa that is located under the inguinal ligament [36].

As you leave this ring itself, the femoral canal is 1.5-2.0 cm long triangles, its walls are: Crescentic fascia lata anteriorly, cochlear fascia posteriorly and medially, and femoral vein sheath externally. The hernial diaphragm is surrounded by a ring of vessels: The femoral vein externally, the inferior epigastric artery from above, and the medically obstructing

artery (if it exits from the inferior epigastric artery). All these things should be taken into account while performing operations in the groin area. The boundaries of the entire abdominal wall are: Xiphoid process and costal arches (top), bones of the pubic region, symphysis, inguinal ligaments and cortex of iliac bones (bottom), axillary line (posterior) [37-39].

The abdominal cavity exceeds the specified boundaries due to enlargement due to the dome of the diaphragm and the small pelvic cavity [40-43]. Two vertical lines along the outer edge of the rectus abdominis muscles and two horizontal lines drawn through the anterior superior iliac spine and through the cartilage of the tenth ribs, the anterior wall of the abdomen is divided into nine areas. Two hypochondria and proper hypogastric form hypogastrium, umbilical region, right and left - mesogastrium, suprapubic, right and left ilio-inguinal, left - epigastrium [44-46].

Conclusion

A straight line starts from the xiphoid process and the precious arch and connects to the posterior surface of the pubic bone. Transverse in the form of aponeurosis starts from the cartilage of the lower ribs, lumbar and dorsal iliac fascia and goes into the anterior aponeurosis at the outer edge of the rectus muscle and forms the spiegel line (the weakest point of the abdominal wall). The internal oblique arises from the superficial leaflet of the lumbar aponeurosis, the iliac back and the upper half of the inguinal ligament. This fan is formed from the back to the front and from the bottom to the top and passes into the aponeurosis at the inner edge of the rectus muscle and along the inguinal ligament is formed by the spermatic cord with the inferior fibers, the muscle that lifts the testicle. The external oblique originates from the 8 lower ribs and the wing of the ilium and is passed forward and downward near the outer edge of the rectus abdominis muscle [38].

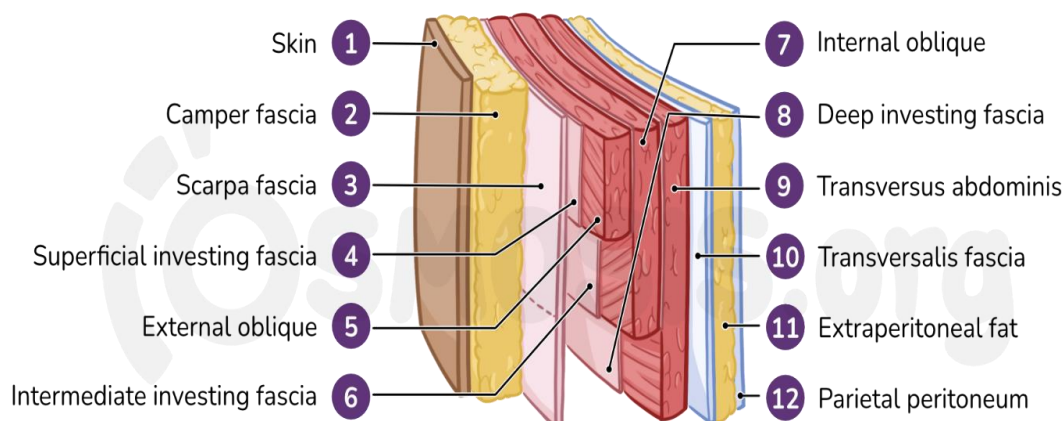


Figure 3. Anatomy of the anterolateral abdominal wall

The part of the aponeurosis that stretches between the anterior superior iliac spine and the glandular tube is called the inguinal ligament. The fibers of the aponeurosis above the inguinal ligament change into 2 legs, the lateral part of which is connected to the tube of the gland and mediates to the symphysis, thus forming the external inguinal ring.

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Authors' Contributions

All authors contributed to data analysis, drafting, and revising of the paper and agreed to be responsible for all the aspects of this work.

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