

Applied Anatomy of Inguino-Scrotal region

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Introduction

The inguinal area has a complex anatomical structure. It includes a number of clinically significant structures, including the inguinal canal, the subject of this article. The lower anterior abdominal wall's inguinal canal is a hole that sits just above the inguinal ligament. The external inguinal orifice is where it finishes after extending medially and inferiorly through the layers of the abdominal wall from the internal inguinal orifice. The length of this channel ranges from four to six cm. From childhood to adulthood, the length varies during the growth phase. Between the intra- and extra-abdominal structures, it serves as a conduit for various structures. The spermatic cord, gonadal vessels, and lymphatics are all transmitted in men. While in females, it transmits the uterine ring ligament. Clinically significant inguinal hernias and, to a lesser extent, inguinal lymphadenopathy and varicocele, are surgical issues that affect this region frequently.

Structure and Function

For the surgical treatment of inguinal hernias, understanding the anatomy of the inguinal canal is crucial. Widening can form as a natural canal with orifices, allowing other abdominal cavity structures to flow through to the extra-abdominal area. This form of hernias are believed to be mostly caused by a chronic rise in abdominal pressure. A significant surgical issue that frequently requires surgical treatment is inguinal hernias. To perform a correct surgical repair of the inguinal hernias, it is essential to have a thorough awareness of the local anatomy. The front wall, posterior wall, and roof make up the inguinal canal. the inguinal ligament, which forms the canal's bottom. The external oblique aponeurosis's inferiorly thickened section is the inguinal ligament. The external oblique aponeurosis makes up the anterior wall. The transversalis muscle

makes up the posterior wall. The united fibers of the internal oblique and transversus abdominis muscles, as well as the conjoint tendon, make up the more intricate portion, the roof. The majority of the medial region of the posterior wall is made up of the conjoint tendon. To comprehend the numerous hernias in the area and to carry out the various methods of surgical treatment, a solid understanding of inguinal anatomy is necessary.

The mid-inguinal point delineates the region between the anterior superior iliac spine and the pubic symphysis, which is significant information for surgeons. The femoral artery reaches the lower leg deep within the pelvic cavity. Only below the inguinal ligament can one feel the femoral artery.

Embryology

Testicles gradually descend from the posterior abdominal wall and move towards the scrotal region during development. The gubernaculum, a cord-like structure, controls the testicles' descent or migratory movement. It joins the testicular inferior pole to the growing scrotal sac.

A peritoneal outpouching known as the processus vaginalis accompanies the testicles as they descend to the scrotum. The processus vaginalis deteriorates when the testicles enter the scrotum. This obliteration or degeneration process may fail entirely or be postponed. A number of problems are more likely to emerge when the processus vaginalis fails to close. A hydrocele can develop as a result of peritoneal fluid passing through a patent processus vaginalis. Inguinal hernias may become more likely to form if processus vaginalis persists.

Testes that have not descended to varied degrees are possible as a result of testicular failure. This is a typical surgical issue in children.

Nerves

The structures of the inguinal canal are home to two recognized nerves. These nerves are the genitofemoral and ilioinguinal nerves. A third nerve

that supplies feeling to the skin above the genitalia, the iliohypogastric nerve, does not pass via the inguinal canal. It first pierces the external oblique in the inguinal region, then the transversus abdominis.

Muscles

- The external oblique muscle's aponeurosis forms the anterior wall, which is lateralized by the internal oblique muscle. The medial third is also influenced by the superficial inguinal ring.
- The transversalis fascia, conjoint tendon, and deep inguinal ring together make up the posterior wall, often known as the floor.
- The medial crus of the external oblique aponeurosis, the musculoaponeurotic arches of the internal oblique and transverse abdominal muscles, and the transversalis fascia combine to produce a superior wall, commonly known as the roof.
- The iliopubic tract and lacunar ligament medially and laterally support the inferior wall, which is created by the inguinal ligament.

The inguinal canal has two entrances:

The deep or internal ring is situated lateral to the epigastric arteries and just above the inguinal ligament's midpoint. The transversalis fascia, which provides the posterior covering of the contents of the inguinal ring, forms the deep ring.

The inguinal canal terminates at the superficial or external ring. It is situated directly above the pubic tubercle. The external oblique muscle fibers that make up the superficial ring have a triangular form. As they move down into the scrotal region, these fibers keep covering the inguinal contents. Tendinous fibers, also known as interligamentous fibers, that are next to the superficial ring serve as a barrier to the ring's ability to grow.

Surgical Importance

A common surgical condition is inguinal hernias. Identification and surgical correction of inguinal hernias depend on an understanding of the anatomy of the inguinal canal. Inguinal hernias are surgically treated by decreasing the hernial content and sac and then reconstructing the hernial defect and

posterior inguinal wall. Over the years, various repair techniques have been employed. Traditionally, the defect was mostly closed or the borders of the expanded inguinal ring were approximated to add strength. It was noted that the unacceptable high recurrence rate of this kind of repair. The approximated tissue was subjected to severe tension, which accounts for the high recurrence. High stress on the faulty edges will arise from forcing the tissue to approximation. The weakening and hernial defect will return over time as a result of this stress pulling through the tissue. The posterior wall of the inguinal canal needs to be strengthened, hence it was discovered that another material was required. The use of a mesh was then decided upon. Without subjecting tissue to strain, the mesh offers the required strength.

Clinical Importance

To avoid nerve damage during inguinal hernia surgery is extremely important since it can result in serious morbidity. Ilioinguinal and vaginal nerves may be squeezed during suturing around the internal oblique muscle in mesh-based hernia repairs. Following surgery, the patient may have severe pain or tingling in the innervated areas.

Given that it passes through the inguinal canal, the spermatic cord is easily identifiable. It connects with the testis along with a number of tiny arteries and nerves. The testicular artery, artery to the vas deferens, and cremaster artery are three important components of the spermatic cord. Along with the cord, lymphatics, the pampiniform plexus, and the genital branch also run. Incorrect handling of the spermatic cord during surgical dissection can harm any combination of these structures.

Inguinal hernias are known to occur in the inguinal region and canal. Groin hernias refer to both inguinal and femoral hernias. Although less frequent, other surgical conditions such hydrocele, varicocele, and undescended testes are seen in the region.

Indirect Hernia

When the peritoneal sac enters the inguinal canal via the deep inguinal ring, it may result in an indirect hernia. Through the external inguinal ring, the hernia is visible. After birth, the processus vaginalis often fails, which is common.

Direct Hernia

A deficiency or weakening in the posterior wall of the inguinal canal, typically the transversus abdominis, allows the peritoneal sac to enter the canal directly in a direct hernia. Although it occasionally exits through the external inguinal ring, it typically protrudes directly to the abdominal wall.

Both inguinal hernias frequently manifest as swellings in the labia majora or inguinal region that are more noticeable when the person is upright.

Femoral Hernia

The medial portion of the femoral canal, the femoral ring, allows the hernial sac to protrude. In the open method, surgical correction of femoral hernias differs slightly from that of inguinal hernias. While the minimally invasive approach uses the same technique.

Hydroceles

A hydrocele can coexist with an indirect hernia and develops as a result of the processus vaginalis' continued patency. The scrotum fluid builds up as a symptom of the illness. Because of the considerable fluid buildup, most hydroceles require surgical surgery.

Other Issues

Additionally connected to the lymph nodes' drainage basin in the inguinal region is lymphadenopathy brought on by infections and cancers. Although primary inguinal malignancies are uncommon, a lymphoma might manifest as bilateral groin lymphadenopathy. It is typical for initial lower-limb cancers like cutaneous melanoma to cause secondary lymphadenopathy. Other recognized tumors of the inguinal region include spermatic cord lipomas and cancerous tumors like rhabdomyosarcomas.

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