SPERMATIC CORD

The spermatic cord is the tubular structure that suspends the testes and epididymis.

Organ Male

About Spermatic cord

The spermatic cord, also called funiculus spermaticus, is a paired structure found in men. Located in the groin and scrotal area, it unites multiple components (the ductus deferens, nerves, blood vessels, ... all described later) into one, sheathed by fascias. It mediates a connection between the testes and the rest of the body.

Function

Each component of the spermatic cord has its own function. Ductus deferens is a muscular tube through which sperm travels during ejaculation. The surrounding tissue provides the testes with everything needed – oxygen, nutrients, nerve supply etc. More detailed description of the components follows in the next paragraph.

Anatomical structure

When cut open, the spermatic cord contains the ductus deferens (macroscopically seen as a muscular tube), and tissue with arteries (a. ductus deferentis, a. testicularis), nerves (nerve plexus along the cremasteric muscle, and testicular nerves), vein plexus (plexus pampiniformis), and tunica vaginalis (i.e. remains of the embryonic processus vaginals of the peritoneum).

Lymphatic vessels are also present. It runs from the deep inguinal ring (i.e. the entrance to the inguinal canal) down to each testis. (Pic. 1; Pic. 2) The normal diameter of the spermatic cord is about 16 mm. It is ensheathed in three layers: external spermatic fascia (an extension of the fascia overlying the external oblique muscle), cremasteric muscle and fascia, and internal spermatic fascia (which is continuous with the transversalis fascia of the abdominal wall).

Histological structure

Histological structure is in conformity with the anatomical structure. There is the ductus deferens, a tubular structure with a thick wall made of three layers of smooth muscle (based on the laying of the cells, inner and outer layer are longitudinal, middle is circular). Along with blood vessels (arteries and veins), lymphatic vessels and nerves, it is embedded in loose connective tissue. The covering fascias are layers of thick connective tissue.

Development

The embryonic and fetal development of the spermatic cord is closely related to the testicular development. The testes start developing in the 5th week of pregnancy. In that time, the future testes and ovaries look the same. It’s not until gene SRY (physiologically located on chromosome Y, thus only in men) is expressed (i.e. the information from the gene is used) that the indifferent gonads start becoming testes. If the gonads are not influenced by SRY, they turn into ovaries. Originally, the testes are located in the lumbar region in the retroperitoneum (i.e. a space in the abdominal cavity behind the peritoneum). During weeks 12 to 28 of pregnancy, the testes descend from their original position down to scrotum. As they descend, they pull the layers of the abdominal wall, from which the testicular envelopes arise. The spermatic cord forms as a result of this relocation: Not only layers of the abdominal wall are dragged by the migrating testes, but also blood vessels and other structures, that, together with the envelopes, form the spermatic cord.
Pathological conditions

Testicular torsion

Testicular torsion (Pic. 3) is an emergency condition that happens when the spermatic cord twists and therefore the testicular blood supply is cut off. The testes require abundant blood flow for active spermatogenesis (i.e., a process by which spermatocytes, i.e. direct sperm precursor cells, develop in the testis from germ cells) and testosterone secretion. Therefore, blood flow interruption easily leads to spermatogenic disturbance. It is the most common cause of acute scrotal pain in prepubertal and adolescent boys. Late presentation to hospital is the major cause of delay in diagnosis and mostly leads to orchidectomy (or orchiectomy, a surgical procedure in which one or both testes are removed) in such patients. Human testes occasionally survive up to 10 hours of torsion: however, viability is considerably reduced after 4–6 hours of ischemia.

Treatment involves rapid restoration of blood flow to the affected testis. Manual detorsion by external rotation of the testis can be successful, but restoration of blood flow must be confirmed following the manoeuvre. Surgical exploration provides definitive diagnosis and management according to findings.

Inguinal hernia

An inguinal hernia (Pic. 4) is a protrusion of abdominal cavity contents through the inguinal canal. Symptoms are present in about 66% of affected people. This may include pain or discomfort especially with coughing, exercise, or bowel movements. Often it gets worse throughout the day and improves when lying down. A bulging area may occur that becomes larger when bearing down.

The main concern is strangulation, where the blood supply to part of the intestine is blocked. This usually produces severe pain and tenderness of the area.

Hernias are partly genetic and occur more often in certain families. Risk factors for the development of a hernia include: smoking, chronic obstructive pulmonary disease, obesity, pregnancy, peritoneal dialysis, collagen vascular disease, and previous open appendectomy (i.e. surgical removal of the appendix), among others.

Groin hernias that do not cause symptoms in males do not need to be repaired. Repair, however, is generally recommended in females due to the higher rate of femoral hernias (a hernia not through inguinal canal, but through femoral canal, which normally allows passage of the common femoral artery and vein from the pelvis to the leg) which have more complications. If strangulation occurs immediate surgery is required.

Varicocele

A varicocele (Pic. 5) is an abnormal dilation and enlargement of the scrotal venous pampiniform plexus which drains blood from each testicle. While usually painless, varicoceles are clinically significant because although the exact mechanism remains unclear, they are the most commonly identified cause of abnormal semen analysis, low sperm count, decreased sperm motility, and abnormal sperm morphology.

Many men with varicoceles are fertile, but others have sperm that is compromised in function, morphology, numbers, or movement. The most accepted theory is that increased blood flow leads to higher intratesticular temperatures which are the main cause of impaired sperm in varicoceles.

There are no effective medical treatments. If a varicocele is causing pain or discomfort, the use of analgesics and scrotal support can be used initially. Surgery is also possible. Another possibility is passing a catheter into the spermatic vein and provoking embolization.

Vasectomy

Vasectomy (Pic. 6) is a perpetual method of contraception accessible to men. It is a surgical procedure in which the ductus deferens is interrupted, therefore the sperm can no longer travel through the ductus deferens during ejaculation and cause pregnancy. In many of the possible methods, a small section of the ductus deferens is evacuated and remaining ends may be tied off or obstructed with surgical clasps. Or they might be be shut using an instrument with an electric current.
Find more about related issues

Diagnoses

Testicular failure
The inability of the testicles to produce sperm or testosterone.
Learn more at: [www.fertilitypedia.org/therapy/diag/testicular-failure](http://www.fertilitypedia.org/therapy/diag/testicular-failure)

Gallery

Pic
Overview of the components of the male reproductive system, along with the neighbouring structures. Spermatic cord is not pictured, vas deferens is here represented on its own.

Pic
An overview of structures in the scrotum. Main content is the testes and the spermatic cords.

Pic
Two different types of testicular torsion: extravaginal on the left, intravaginal on the right.

Pic
A CT scan of an incarcerated inguinal hernia.
A comparison between normal and varicose plexus pampiniformis.

Normal  Varicocele

Scheme of vasectomy. In this procedure, only vas deferens is interrupted, leaving the rest of the structures passable.

Sources

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