

MALE GENITAL ORGANS

Internal genital organs - gonads (testes) – spermatozoa and sex hormone testosterone
genital tract (epididymis, ductus deferens, urethra masculina)
glands (vesiculae seminales, prostata)

External genital organs - penis, scrotum

Testis

Facies medialis et lateralis

Extremitas superior et inferior

Margo anterior et posterior

Tunica vaginalis - lamina visceralis et parietalis

Tunica albuginea

Mediastinum testis

Septula testis

Lobuli testis - tubuli seminiferi contorti

Tubuli seminiferi recti - rete testis

Leydig's interstitial cells

Hilum testis

Ductuli efferentes testis

A. testicularis

Plexus pampiniformis - v. testicularis

Nodi lymphatici lumbales

Sympathetic nerves - abdominal plexuses

Parasympathetic nerves - n. vagus

Sensory fibers - Th10

Epididymis

Caput epididymidis

Corpus epididymidis

Cauda epididymidis

Sinus epididymidis - lig. epididymidis superius et inferius

Lobuli epididymidis

Ductus epididymidis

A. testicularis

Plexus pampiniformis

Nodi lymph. lumbales, iliaci int. and inguinales spf.

Nerves - autonomic plexus testicularis and sensory fibers end in the segments Th11-12.

Appendix testis (the remnant of the Müller's duct)

Appendix epididymidis (the remnant of the Wolff's duct)

Ductuli aberrantes (the remnant of the mesonefros)

Descent of the testes (descensus testium)

The testicles and epididymides originally form in the abdominal cavity at the level of the L1-2 vertebrae. Due to the growth of the fetus the gonads relatively descend to the internal inguinal ring (anulus inguinalis profundus) at the end of the 4th month. The mesenchyme thickens to the gubernaculum, a ligament that extends from the testis through the anterior abdominal wall and inserts into the internal surface of the scrotum. Later, a fingerlike pouch of the

peritoneum, called processus vaginalis, follows the gubernaculum and evaginates the anterior abdominal wall to form the inguinal canal. The processus vaginalis pushes extensions of the anterior abdominal wall before it and they become the coverings of the spermatic cord and testicle. The testis follows the processus vaginalis and enters the inguinal canal at the end of the 7th month. The processus vaginalis surrounds testis and epididymis as the **tunica vaginalis** and the space between both layers changes to the slit-like cavity (cavum serosum scroti). The stalk of the processus vaginalis normally obliterates shortly after birth to form lig. vaginale. The gubernaculum changes to the lig. scrotale. Retentio testis is an abnormality when the testis is retained somewhere along the inguinal canal. Such testis has to be pulled into the scrotum as soon as possible to avoid the serious complications like sterility and malignity. The open processus vaginalis (it does not obliterate) may result in congenital inguinal hernia that is always indirect (oblique). The rare abnormality is ectopia testis when the testis is located in an atypical site as in the perineum, penis, and thigh.

Ductus deferens

1. pars epididymica
2. pars funicularis
3. pars inguinalis
4. pars pelvina

ampulla ductus deferentis - diverticula ampullae ductus deferentis.

The musculature is innervated by the sympathetic nerves and is very important for ejaculation. It sucks sperm from the epididymis and gushes (expel) it into the urethra.

Ductus deferens + ductus excretorius = ductus ejaculatorius that passes through the prostate to enter the prostatic part of the urethra.

A. ductus deferentis, plexus pampiniformis and plexus vesicalis, nn. lymph. iliaci int. et ext., sympathetic nerves from nn. splanchnici lumbales.

The spermatic cord (funiculus spermaticus)

Contains structures that run through the inguinal canal (ductus deferens, a. testicularis, a. ductus deferentis, venous plexus pampiniformis, nervous plexus testicularis et deferentialis, lymph vessels). They are connected by the loose connective tissue and enveloped by the coverings continuous with the coverings of the testis and epididymis. The anterior part contains a. testicularis, plexus pampiniformis and plexus testicularis, the posterior part contains the ductus deferens, its vessels and nerves. Ductus deferens is palpable as the rigid cord.

Inguinal canal

4 walls: Posterior wall – fascia transversalis, reinforced medially by the conjoint tendon (common tendon of the internal oblique and transverse muscles) – **falx inguinalis**, laterally by **the interfoveolar ligament** – connective tissue containing inferior epigastric vessels. These strengthened sites are alternated by two weak regions: **inguinal triangle** of Hesselbach that lies behind the superficial inguinal ring – between the conjoint tendon and interfoveolar lig., and **deep inguinal ring** – lateral to the interfoveolar lig. Inferior wall – **inguinal lig.** – inferior border of the aponeurosis m. obliqui externi abdominis (EOM). Anterior wall – aponeurosis EOM, contains the superficial ring – surrounded by the medial and lateral crura, intercrural ligament and posterior reflected inguinal lig. Superior wall – inferior fibers of the internal oblique and transverse muscles – m. cremaster.

Coverings of the testes, epididymides and the spermatic cords

Epiorchium (lamina visceralis tunicae vaginalis) - a derivative of the visceral peritoneum
Periorchium (lamina parietalis tunicae vaginalis) - a derivative of the parietal peritoneum
Cavum serosum scroti
Fascia spermatica interna - a derivative of the fascia transversalis
M. cremaster together with the connective tissue forms fascia cremasterica
Fascia spermatica externa - a derivative of the fascia abdominis spf.

Seminal vesicles (vesiculae seminales)

Ductus excretorius

Thick alkaline secretion that forms about 50 – 80 % of the volume of seminal fluid. The secretion contains important substances that are the source of energy for sperms. The contractions of musculature influenced mainly by the sympathetic nerves expel the secretion into the urethra.

A. ductus deferentis, a. rectalis media, a. vesicalis inf.

Venous plexus prostaticus et vesicalis. Nn. lymph. iliaci int. Nervous plexus hypogastricus inf.

The prostate (prostata)

Basis prostatae

Apex prostatae

Facies anterior - ligg. puboprostatica and m. puboprostaticus

Facies posterior

Facies inferolaterales

Lobus dexter

Lobus sinister

Lobus medius

Isthmus prostatae (lobus anterior)

Capsula propria

Plexus venosus prostaticus

Fascia periprostatica

30- 50 tubuloalveolar glands

Ductuli prostatici (prostatic sinuses)

Glands of the prostate produce the weakly acidic secretion that forms 15 – 30% of the volume of semen. It contains substances important for the activity of sperms. The testosterone influences the function of the prostate and is broken down in the gland. In elderly men the ability of degradation is disturbed and a higher level of the hormone causes the hyperplasia of the inner zone that contains mainly submucosal glands – adenoma of the prostate = BHP (benign hypertrophy of the prostate) which may result in bladder outlet obstruction. While rarely seen in men younger than 40 years, it occurs in 50% of men older than 50 and 80% of men older than 70 years. Malignant tumors of the prostate affect mainly its outer zone that contains most of glands.

A. rectalis media, a. vesicalis inf., a. pudenda int. Branches from right and left sides do not form anastomoses so that an avascular zone is in the midplane.

Plexus venosus prostaticus – plexus venosus vesicalis – v. iliaca int.

Nn. lymph. iliaci int. et ext., nn. lymph. sacrales.

Plexus hypogastricus inf. - parasympathetic fibers from the sacral parasympathetic system, sympathetic fibers - from lumbar segments.

Glandulae bulbourethrales

Pea-size glands in the deep perineal space producing mucus-like alkaline secretion into the spongy part of the urethra during sexual arousal.

Ductus glandulae bulbourethralis.

Male urethra (urethra masculina)

Ostium urethrae internum

Ostium urethrae externum – the narrowest part of the urethra.

4 parts:

1. pars intramuralis –surrounded by the smooth m.sphincter vesicae.
2. pars prostatica –crista urethralis, colliculus seminalis, 8 mm long blind utriculus prostaticus (a remnant of the Müller's duct), ductus ejaculatorii, sinus prostatici (ductuli prostatici).
3. pars membranacea – through the diaphragma urogenitale (m.sphincter urethrae).
4. pars spongiosa – ampulla urethrae (intraulbar fossa) - glandulae bulbourethrales, fossa navicularis - valvula fossae navicularis, glandulae urethrales - lacunae urethrales.

Curvatura subpubica – between pars membranacea and pars spongiosa

Curvatura praepubica

Urethra fixa (posterior)

Urethra mobilis (anterior)

A. vesicalis inf., a. rectalis media, aa. pudendae int. Veins accompany arteries.

Nn. lymph. inguinales spf. from pars spongiosa, nn. lymph. iliaci int. from other parts.

Sympathetic plexus prostaticus and rectalis, parasympathetic fibers – from the sacral parasymp. (nn. splanchnici pelvici). M. sphincter urethrae is innervated from n. pudendus.

Penis

Radix penis

Corpus penis

Glans penis

Corona glandis

Collum glandis

Dorsum penis

Facies urethralis - raphe penis

Foreskin (praeputium)- ostium praeputii, gll. praeputiales - smegma praeputii, frenulum praeputii

Corpora cavernosa - crura penis (crista phallica), septum penis

Corpus spongiosum - bulbus penis, urethra

Tunica albuginea - trabeculae corporum cavernosum - cavernae - aa. helicinae, vv. cavernosae

Fascia penis profunda - v.dorsalis penis profunda, aa. and nn. dorsales penis

Fascia penis superficialis - vv. dorsales penis superficiales

Lig. fundiforme penis, lig. suspensorium penis

A. pudenda int., v. dorsalis penis spf. drains into vv. pudendae externae. V. dorsalis penis prof., vv. profundae penis - v. pudenda int.

Nn. lymph. inguinales spf., nn. lymph. iliaci ext.

Sensory fibers (the glans penis is the most sensitive part of the body) are branches of the n. pudendus.

Ejaculation of the semen consists of two phases. First: emission of sperms and genital glands secretion into the prostatic portion of the urethra. This results from peristalsis in the deferent ducts and seminal vesicles and contraction of the bulbourethral glands and the smooth muscle in the prostate. Emission of the semen is the sympathetic response. Expulsion of the semen from the spongy urethra (ejaculation) follows parasympathetic stimulation. Ejaculation is accompanied by clonic spasms of the bulbospongiosus and ischiocavernosus muscles.

Scrotum

Raphe scroti

Pubes

Tunica dartos scroti - thermoregulation

Septum scroti

Cavum scroti

A.pudenda ext., a. pudenda int., v. femoralis, v. pudenda int., nn. lymph ing. spf.,

Sensory - n.genitofemoralis, ilioinguinalis, pudendus, cutaneus femoris post.

M. cremaster – n. genitofemoralis. Tunica dartos – plexus hypogastricus inf.

The anatomical basis of the erection. When a male is stimulated erotically, the smooth muscle in the fibrous trabeculae and helicinae arteries relaxes owing to parasympathetic stimulation. As a result, the arteries straighten and their lumina enlarge, allowing blood to flow into cavernous spaces. Blood fills and dilates these spaces, the bulbospongiosus and ischiocavernosus muscles compress the venous plexuses at the periphery of the corpora cavernosa and impede the return of venous blood. As a result, the three corpora become enlarged, rigid, and the penis erects. Following ejaculations and orgasm, the penis gradually returns to its flaccid state, a subsiding process called detumescence (resolution). This results from sympathetic stimulation that causes constriction of the smooth muscle in the helicinae arteries. The bulbospongiosus and ischiocavernosus muscles relax, allowing more blood to flow into veins. Blood is slowly drained from the cavernous spaces into the deep dorsal vein.

Circumcision (L. circumcido, to cut around) is the surgical removal of the prepuce. It is usually performed when there is phimosis (when the foreskin fits tightly over the glans and cannot be retracted) or paraphimosis (when there is a narrow preputial opening and retraction over the glans constricts the neck of the penis so much that there is interference with the drainage of blood and tissue fluid from the glans). Although it is a religious practice in Islam and Judaism, it is often done routinely for nonreligious reasons mostly related to hygiene.

