Male Genital Organs

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Introduction, ie. What is this good for?!

Dear students, colleagues,

This presentation summarizes the content of the lecture. It also contains a list of required knowledge and allows its practice with regard to clinical use.

The following pictograms will accompany you:



to recall or remember



to be completed



Male genitals Learning goals, review

You should be able to describe (demonstrate):

- Testis gross anatomy, coverings, basic function, tubules; blood supply, lymph drainage and innervation, relation to the peritoneal cavity
- Epididymis, deferent duct gross anatomy, course (ductules), coverings, basic function; blood supply and innervation, relation to the peritoneal cavity
- Spermatic cord contents, covers, course
- Prostate, seminal vesicles location, gross anatomy, function; blood supply, lymph drainage and innervation; CAVE prostatic lobes, zones
- Male urethra parts, narrow sites, prostatic urethra in details
- Penis gross anatomy, penile urethra, innervation (erection, ejaculation)



Male Genital Organs

Testes: spermatogenesis and steroidogenesis – regulate reproductive function as well as normal physical and sexual development and behaviour.

The accessory sex glands – prostate, seminal glands (vesicles) – their secretions constitute most of the seminal fluid volume, containing nutrients, growth factors and enzymes that are essential for normal spermatogenic function. Bulbo-urethral glands moisten the urethra.

The external genitalia, **scrotum and penis**, are uniquely suited both to optimize the **testicular environment for spermatogenesis** and to facilitate seminal fluid delivery to the female reproductive tract.



Fetal Development Descensus Testium

Layers of the Scrotum





Layers of scrotum: Dartos tunic External spermatic fascia Cremaster muscle Internal spermatic fascia Vaginal process of peritoneum

Fig.: Horizontal section through the scrotum; peritoneum – tunica vaginalis (red arrow)

Lateral and anterior aspect of the testis are covered by a **closed sac of the peritoneum** (*tunica vaginalis*), which <u>originally connected</u> to the abdominal cavity. Normally after testicular descent, the connection closes, leaving a fibrous remnant.

The testes are suspended in the scrotum by the spermatic cord. Their location in the **scrotum**, combined with the characteristics of the scrotal skin and the counter-current heat exchange mechanism of the pampiniform plexus, maintains the testes at a **temperature 3–4 °C** below body temperature (**necessary for the spermiogenesis**!).





Fig.: Brain, limbic system

Coverings of Testis (= layers of the scrotum)





Clinical notes

Hydrocele, cremasteric reflex, criptorchidism

The potential space between the visceral and parietal layers, the cavity (cavum) of the tunica vaginalis, is normally occupied by a thin film of clear, straw-coloured fluid. The volume of this fluid can increase with obstruction of lymphatic drainage due to inflammatory, traumatic or neoplastic conditions of the testis, resulting in a **hydrocele**.



Fig.: Human scrotum in a relaxed state (left) and a tense state (right) – **cremasteric reflex** (L1-2); (Wikipedia(

Types of Hydrocele



Hydrocele = the accumulation of serous fluid in the peritoneal sac, the vaginal tunic



Fig.: Cryptorchidism = undescended testis

Testis, male gonadal gland

In adults, the testes typically measure 4–5 cm in length, 2–3 cm in width.

SPERMATOGENESIS in testis cca 60 days Multiplication --- spermatogonia Maturation Differentiation --- spermatozoa

Ductus deferens Ligamentous remnan of processus vaginalis Differentiation --- spermatozoa Head of epididymis Straight tubule The highly coiled **convoluted** -Efferent ductules seminiferous tubules (400-600 m!) Seminiferous tubule become straight tubules, which Rete testis in mediastinum testis connect to the rete testis in the - Body of epididymia mediastinum testis. The efferent Parietal laver Cavity ductules (12-20) continue into the Visceral layer head of epididymis. Capsule (tunica albuginea) Tail of epididymis

Fig.: Testis, sagittal section

Tunica

vaginalis

Testis: lobules, tubules, and stroma Each lobule contains 1–4 convoluted seminiferous tubules with sperm and Sertolli (sustentacular) cells and interstitium with the endocrine Leydig cells.



Fig.: Testis – microanatomy of the seminiferous tubules and intersticium; **Leydig cells** green arrowhead, **Sertolli cells** red arrowhead. Maturing forms (spermatogonia, spermatocytes, spermatids, and spermatozoa) arrange systematically towards the centre of the tubule.

Testis – layers

The **testes** are enclosed in a tough capsule made up of three **layers**: an innermost **vascular layer**, an intermediate **tunica albuginea**, and an outer **vaginal tunic (serosa)**. **The posterior aspect** of the testis is the site of attachment of the epididymis and is therefore **not covered by serosa**.





Fig.: Tunica albuginea = thick connective tissue capsule – septula – lobules.

Testicular artery, a. of the deferent duct



The **testicular artery** (from the **abdominal aorta**) runs through the inguinal canal, within the **spermatic cord**. It enters the tunica albuginea in the mediastinum of the testis and ramifies beneath it into the vascular layer.

The artery to the **deferent duct** is a branch of the superior or **inferior vesical artery**, which arises from the **internal iliac artery**. It runs within the **spermatic cord**.



Fig. Sagittal and axial sections through the testis. NOTE the blood supply to the epididymis and ductus deferens.

Testis, epididymis – veins, innervation, lymph drainage

The **pampiniform venous plexus** ascends within the spermatic cord anterior to the ductus deferens and continues by 3–4 veins into the inguinal canal. The veins enter the abdomen through the deep inguinal ring and coalesce into a single **testicular vein** that drains into the **inferior vena cava** on the **right** and the **renal vein on the left**.

Regional lymph nodes: paraaortal, paracaval

Innervation:

Inferior hypogastric plexus (sympathetic) and pelvic splanchnic nerves and CN X (parasympathetic).





Fig.: Regioal lymph nodes, testis

PIDDMS

From: Efferent ductules

To: Deferent duct

Where: Sup. pole and dorsum of the testis, out of vaginal proces of peritoneum

Structure: Multilayered columnar with LONG stereocilia (15 µm), smooth muscle cells

Function: It resorbs about 90% of the total secretory fluid – the epididymis stores spermatozoa until ejaculation. **Blood supply, innervation:** the same as testis



Defferent duct, spermatic cord

Defferent duct is a muscular, transportive tube capable of peristaltic contractions. It ascends in the spermatic cord, enters the inguinal canal at the superficial inguinal ring, and then passes into the abdominal cavity through the deep inguinal ring. In pelvis it crosses the ureter from above near the ischial spine, runs medially and downward on the posterior surface of the bladder, and terminates as it turns inferiorly to join the duct of the seminal glands at the ampulla of the ductus deferens.



Pampiniform plexus Artery of the defferent duct Testicular artey Lymphatic vessels Autonomic nerves







Fig.: Spermatic cord, scrotum



Fig.: Fundus of the urinary bladder, view from behind

Defferent duct

From Cauda of epididymis To: Ejaculatory duct Where: Scrotum, inguinal canal, pelvis Structure: Thick, 3-layer muscular wall Function: Transport of the semen Blood supply, innervation: Innervation: hypogastric plexus Blood supply: a. of the deferent duct (inferior vesical artery), and venous drainage via the pampiniform plexus into the internal iliac vein Lymphatic drainage is along vessels that empty into the internal and external iliac nodes

?? Is there any relation between the Kohlrausch's fold in rectum and rectovesical pouch of peritoneum??





examination to detect abnormalities, such as tumors.



Prostatic hyperplasia https://www.youtube.com/watch?v=LVwqYjsfNSU& ab_channel=NucleusMedicalMedia



PROSTATE

The prostate is a tuboalveolar, ovoid **gland** (usually around 3 cm long) through which the first part of the urethra passes. It contains **five lobes**. Four are glandular and produce secretions that are added to the ejaculate during intercourse and orgasm (**posterior, median, and paired lateral lobes**). A <u>fifth fibromuscular isthmic</u> lobe is anterior to the urethra.

Fluid, which is cloudy and milky in color, passes from the prostate to the urethra through several (usually 20 to 30) small prostatic ducts and usually accounts for approximately 20% of the volume of semen.

The prostate is surrounded by a thin capsule, a prostatic venous plexus, and pelvic fascia (false capsule).

Zones: Peripheral – rich in glands (carcinomas!) Central Transitional (benign hyperplasia) Anterior (non glandural)

https://www.youtube.com/watch?v=q0wGAKHXARw&ab_channel=TaimTalksMed from 15:53 min



Fig.: Prostate and the prostatic part of the urethra in men.

PROSTATE

Parasympathetic innervation: pelvic splanchnic nerves (S2 to S4)

Sympathetic innervation: inferior hypogastric plexus Prostatic arteries: inferior vesical artery, the middle rectal artery, and the internal pudendal arteries (branches of the internal iliac artery)

Prostatic venous plexus, which drains toward the internal iliac veins

Lymphatic vessels from the prostate gland drain toward the internal iliac and sacral nodes



Source: Mark. H. Hankin, Dennis.E. Morse, Carol. A. Bennett-Clarke: Clinical Anatomy: A Case Study Approach Copyright © McGraw-Hill Education. All rights reserved.



Male genital organs; L. Eberlova, 2023

Penis





Body, root Albugineous tunic, septum Cavernous bodies (crura), spongy body (bulb, urethtra) Glans (corona), prepuce (smegma)