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Кафедра анатомии человека
с курсом оперативной хирургии и топографической анатомии

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МОЧЕПОЛОВОЙ АППАРАТ

Учебно-методическое пособие
для студентов 1 курса факультета по подготовке специалистов
для зарубежных стран, обучающихся на английском языке,
учреждений высшего медицинского образования

GENITOURINARY APPARATUS

Teaching workbook
for 1nd year students of the Faculty for training specialists
for foreign countries, studying in English,
of higher medical education institutions

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GENITOURINARY APPARATUS

Genitourinary apparatus combines two systems of organs: *the urinary organs* which provide the formation and excretion of urine from the body, and *the genitals*, carrying out the function of reproduction. The organs of these systems have a common origin, development and are close topographically. Therefore, urinary and genital organs are united by the common name "*genitourinary apparatus*".

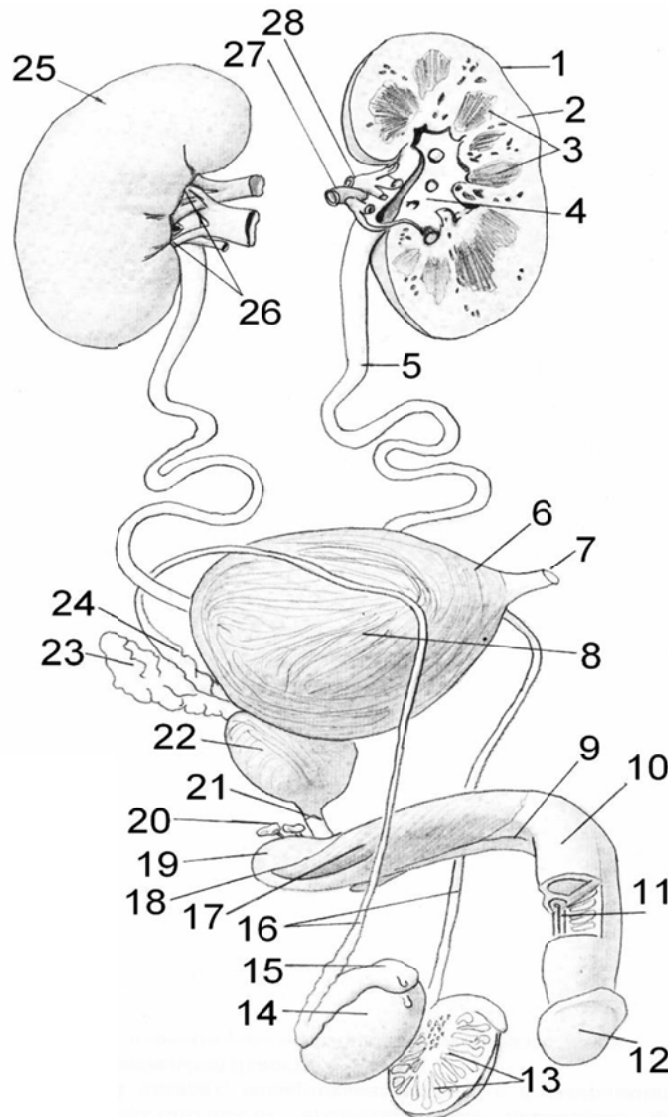


Figure 1 — Genitourinary system of a man (semishematically):

- 1 — ren sinister; 2 — cortex renis; 3 — pyramides renales; 4 — pelvis renalis;
 5 — ureter sinister; 6 — apex vesicae; 7 — lig. umbilicale medianum; 8 — corpus vesicae;
 9 — corpus spongiosum penis; 10 — corpus cavernosum penis; 11 — pars spongiosa urethrae;
 12 — glans penis; 13 — lobuli testis; 14 — testis; 15 — epididymis; 16 — ductus deferens;
 17 — m. ischiocavernosus; 18 — radix penis; 19 — m. bulbospongiosus;
 20 — glandula bulbourethralis; 21 — pars membranacea urethrae; 22 — prostate;
 23 — vesicula seminalis; 24 — ampulla ductus deferentis; 25 — ren dexter;
 26 — hilum renalis; 27 — a. renalis; 28 — v. renalis

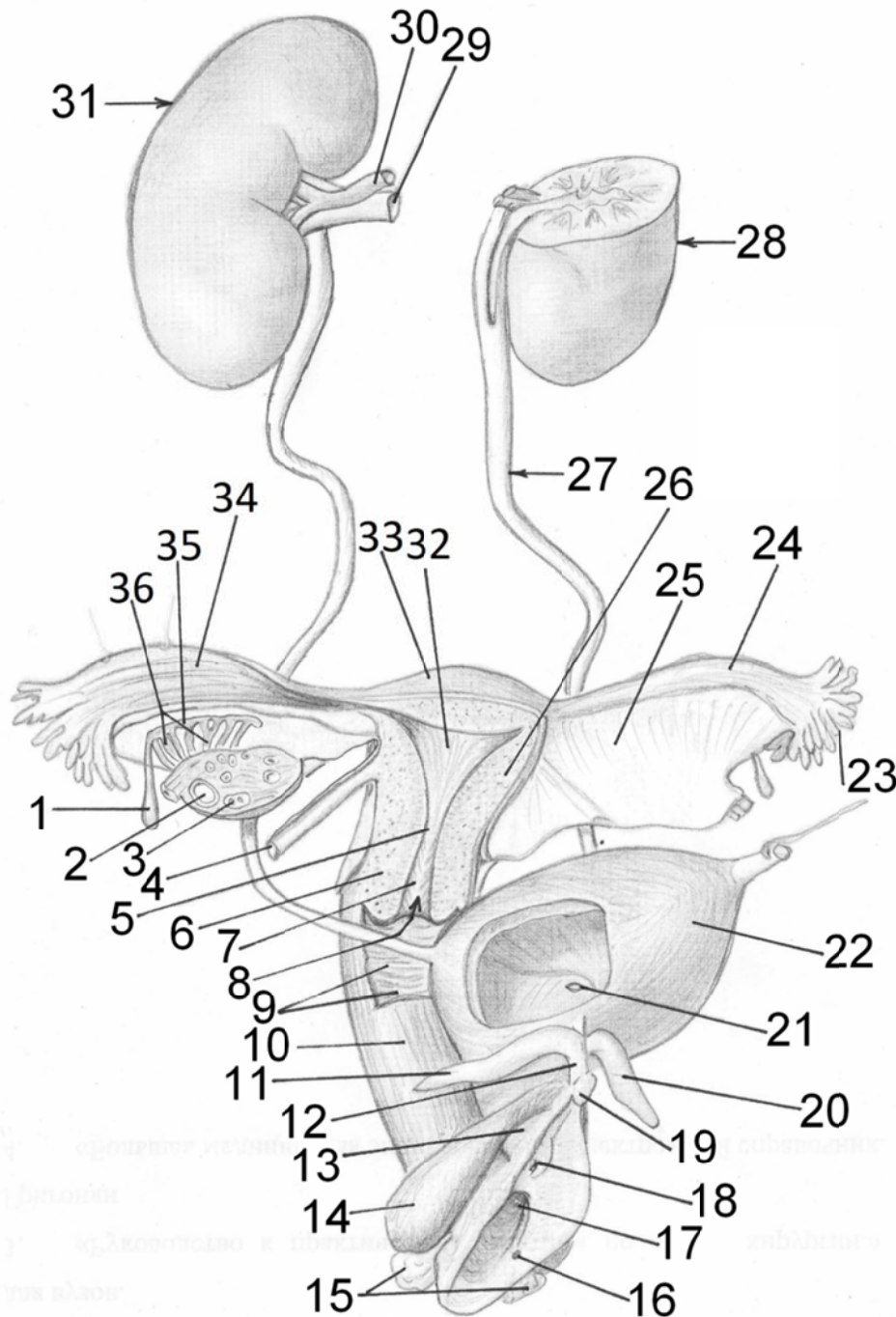


Figure 2 — Genitourinary system of a woman (semishematically):

- 1 — appendix vesiculosa; 2 — folliculus ovarici vesiculosus; 3 — corpus luteum;
 4 — lig. teres uteri; 5 — isthmus uteri; 6 — cervix uteri; 7 — canalis cervicis uteri;
 8 — ostium uteri; 9 — rugae vaginales; 10 — vagina; 11 — crus clitoridis dexter;
 12 — corpus clitoridis; 13 — urethra feminine; 14 — bulbus vestibule;
 15 — glandulae vestibulares majores; 16 — mouth of duct glandulae vestibularis majoris;
 17 — ostium vaginae; 18 — ostium urethra externum; 19 — glans clitoridis;
 20 — crus clitoridis sinister; 21 — ostium ureteris; 22 — vesica urinaria; 23 — fimbriae tubae;
 24 — ampulla tubae uterinae; 25 — lig. latum uteri; 26 — corpus uteri; 27 — ureter sinister;
 28 — ren sinister; 29 — v. renalis; 30 — a. renalis; 31 — ren sexter; 32 — cavitas uteri;
 33 — fundus uteri; 34 — plicae tubariae; 35 — epoophoron (ductus longitudinales);
 36 — epoophoron (ductuli transversi)

URINARY SYSTEM

The urinary system is a complex of anatomically and functionally interrelated urinary organs, which provide the formation of urine (kidneys), retention of urine from the kidneys (kidney cups, pelvis, ureters), urine accumulation (urinary bladder) and excretion from the body (urethra).

Kidneys

The kidney, *ren* (Greek — νεφρος, *nephros*), is a paired excretory organ that forms and removes urine. The kidney has a bean-shaped shape, a dark red color, a dense consistency. Kidney size in an adult: length 10–12 cm, width 5–6 cm, thickness 4 cm and weight 120–200 g.

Functions:

1. Urinary.
2. Excretory.
3. Maintenance of homeostasis.
4. Endocrine.

Holotopia:

— the kidney are located in the abdominal cavity, in the lumbar region, in the retroperitoneal space, on either side of the spinal column;

— the upper extremities of the kidneys are approximated to each other up to 8 cm, and the lower ones are 11 cm apart.

Skeletaltopia:

— the left kidney lies above the right: the 12th rib crosses the left kidney almost in the middle, and the right one is closer to its upper end;

— the left kidney is located throughout Th_{XI}–L_{II}; the right — throughout Th_{XII}–L_{III}

Sintopia:

— the upper end of the left kidney adheres to the adrenal gland; its front surface touches the stomach, the tail of the pancreas, the jejunal loops, the left curvature of the colon and is turned into the left mesenteric sinus; to the lateral margin is the spleen;

— the upper end of the right kidney adheres to the adrenal gland; the front surface touches the right lobe of the liver, the right bend of the colon; to the medial site and the gates adjoining the descending part of the duodenum.

External structure:

1. The surface of the kidney:
 - facies anterior, more convex;
 - facies posterior, flattened.
2. Edge of the kidney:
 - margo lateralis, convex;
 - margo medialis, concave.

3. Ends (or poles) of the kidney:

- *extremitas superior*, wider and rounded, the adrenal gland is attached to it;
- *extremitas inferior*, more acute.

4. Segments of the kidney.

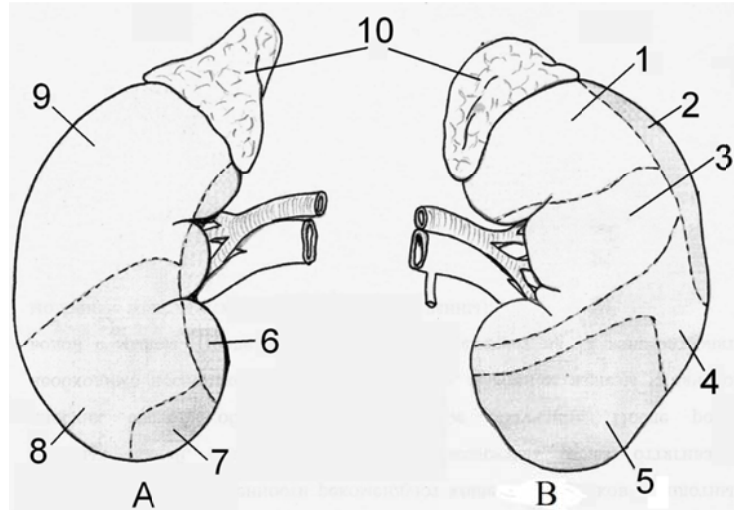


Figure 3 — Field of contact the front surface right kidney (A) and left kidney (B) with internal organs:

- 1 — with stomach; 2 — with spleen; 3 — with pancreatic gland;
- 4 — with the loops small intestine; 5 — with the descending colon; 6 — with duodenum;
- 7 — with the loops small intestine; 8 — with the right bending colon;
- 9 — with liver; 10 — gl. suprarenalis

The division of the kidney into segments is due to the peculiarities of its blood supply. Each segment consists of 3–4 lobes (*lobus renalis*).

In the middle of the medial margin there is a depression - the kidney gate, *hilum renalis*, the site of penetration into the kidney of the elements of the renal peduncle, *crus renis*. The kidney crus is a collection of the renal artery, vein, nerves and ureter. The kidney gates continue into the kidney substance, where there is a large depression — *sinus renalis*. The renal sinus is filled with fatty tissue, blood and lymphatic vessels, nerves, large and small renal calyces and a renal pelvis.

Kidney shells:

1. Fibrous capsule, *capsula fibrosa* — loosely associated with the kidney parenchyma and easily separated.

2. Fat capsule, *capsula adipose* is a fatty tissue, which forms a perineal fat body at the back, *corpus adiposum pararenale*.

3. Renal fascia, *fascia renalis* — is part of the intra-abdominal fascia, *f. endoabdominalis*:

— the front leaflet, *lamina prerenalis fascia renalis*, encompasses from the front two kidneys, the kidney crus, the abdominal part of the descending aorta and the lower vena cava;

— the posterior leaflet, lamina retrorenalis fascia renalis, separates each kidney from the fascia of the muscular kidney bed, it is fixed to the vertebral bodies.

The leaflets of the renal fascia are interconnected from above and laterally, forming fascial kidney bags open downwards. From the sheets of the renal fascia to the fatty body and fibrous capsule there are numerous connective tissue strands, thereby providing fixation of the kidneys.

Fixing apparatus of the kidney.

It provides a relatively constant position of the kidney. Refers to him:

1. The kidneys.
2. Renal leg.
3. The muscular bed, which is represented by the transverse abdominal muscle (m. transversus abdominis), the square waist muscle (m. quadratus lumborum), the large lumbar muscle (m. psoas major) and the diaphragm (diaphragm).
4. Peritoneum. The kidney with respect to the peritoneum lies retroperitoneally.
5. Intra-abdominal pressure, created by contraction of abdominal muscles.

Internal structure:

1. Cortex renalis, (0.4–0.7 cm) is located on the periphery and between the pyramids of the medulla — *the renal (Bertinia) pillars, columnae renales (Bertinii)*, under the fibrous capsule:

— *the radiant part, pars radiata*, — lighter parts of the cortex, in which the wide sections of the Henle loop are located, as well as the initial sections of the collecting tubes;

— *the curved part, pars convolute*, — the darker areas of the cortical substance to which the renal corpuscle, proximal and distal convoluted tubules are located.

2. Medulla renalis, is located in the center and consists of separate sections of a triangular shape (10–15 of them), called pyramids of the kidney, *pyramydes renalis (Malpighii)*. Each pyramid has a base, the base pyramis, facing the lateral margin, and the apex (apex pyramis), directed into the renal sinus. The renal pyramid contains the knee of the nephron loop, genu ansae nephroni; *collecting tubules, tubuli renalis colligens; papillary ducts, ductuli papillares*. In the region of the renal papilla, the collecting tubules merge and form *papillary grooves* (15–20). Each papillary grooves on the tip of the papilla opens with holes — *foramina papillaria*. Holes at the top of the papilla form a *lattice field, area cribrosa*.

The proportion of the kidney, lobus renis, is a renal pyramid, with a cortex attached to it, bounded by interlobular vessels; 2–4 renal lobes constitute the segment of the kidney. Cortical lobe, is a radiant part surrounded by a folded part, which are bounded by interlobular vessels. In the kidney there are about 600 cortical lobules.

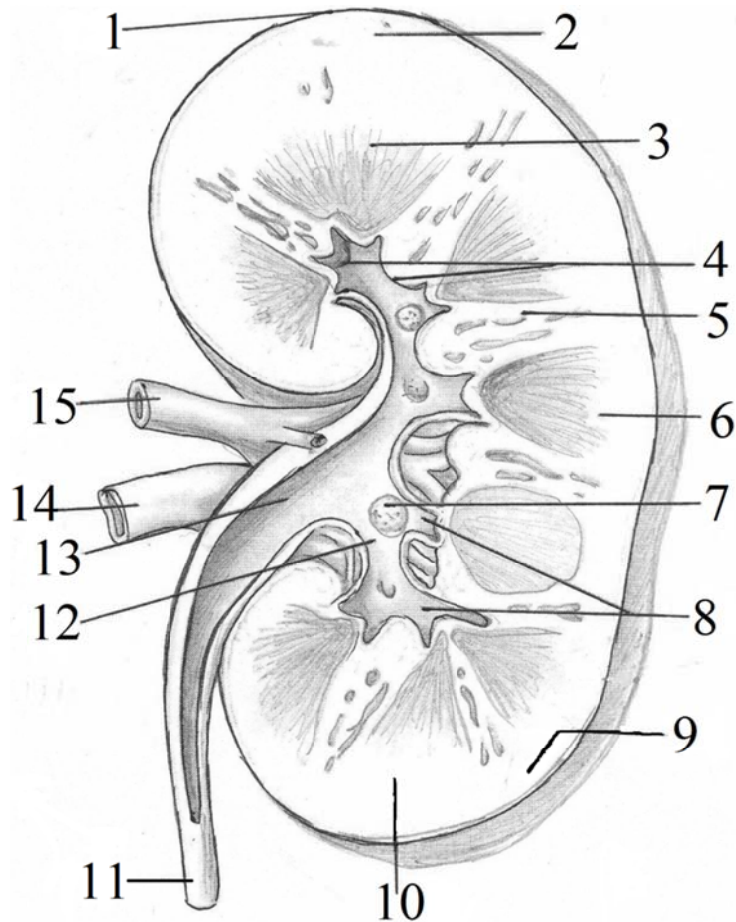


Figure 4 — Cut the kidneys in frontal plane:

- 1 — capsula fibrosa; 2 — cortex renalis; 3 — medulla renalis; 4 — papillae renales;
 5 — columna renalis; 6 — basis pyramidis; 7 — area cribrosa; 8 — calices renales minores;
 9 — pars convoluta; 10 — pars radiata; 11 — ureter; 12 — calyx renalis major;
 13 — pelvis renalis; 14 — v. renalis; 15 — a. renalis

Microscopic structure

The structural and functional unit of the kidney is the *nephron*. It distinguishes the following parts:

1. The kidney body (Malpighi), corpusculum renale (Malpighii):

— *capsule of the glomerulus (Shumlyansky-Bowman)*, *capsula glomeruli*, consisting of parietal and visceral sheets. The visceral leaf is densely fused with the capillaries of the glomerulus. Between the sheets is a capsular space, communicating with the proximal convoluted tubule;

— *capillary glomerulus of the renal corpuscle (glomerulus corpusculi renalis)*, is represented by a small network of capillaries anastomosing with each other. In the glomeruli, blood enters the arterioles (arteriola glomerularis afferens, vas afferens). A flows over the outgoing arterioles (arteriola glomerularis efferens, vas efferens). Since the arteriolus carrying the diameter is larger than the bearer, a pressure gradient is created between them and a process of primary urine formation occurs (150-200 l. per day) in the renal corpuscle.

2. The proximal convoluted tubule, *tubulus renalis contortus proximalis*.
3. Nephron loop (Henle), *ansa nephroni*:
 - descending part (*pars descendens*);
 - the knee of the nephron loop (*genu anse nephroni*);
 - ascending part (*pars ascendens*).

In the nephron loop secondary urine formation occurs (1.5–2 l. per day). From the primary urine through the reverse absorption (reabsorption) nutrients enter the capillary network, braiding the loop of Henle.

4. Distal convoluted tubule, *tubulus renalis contortus distalis*.

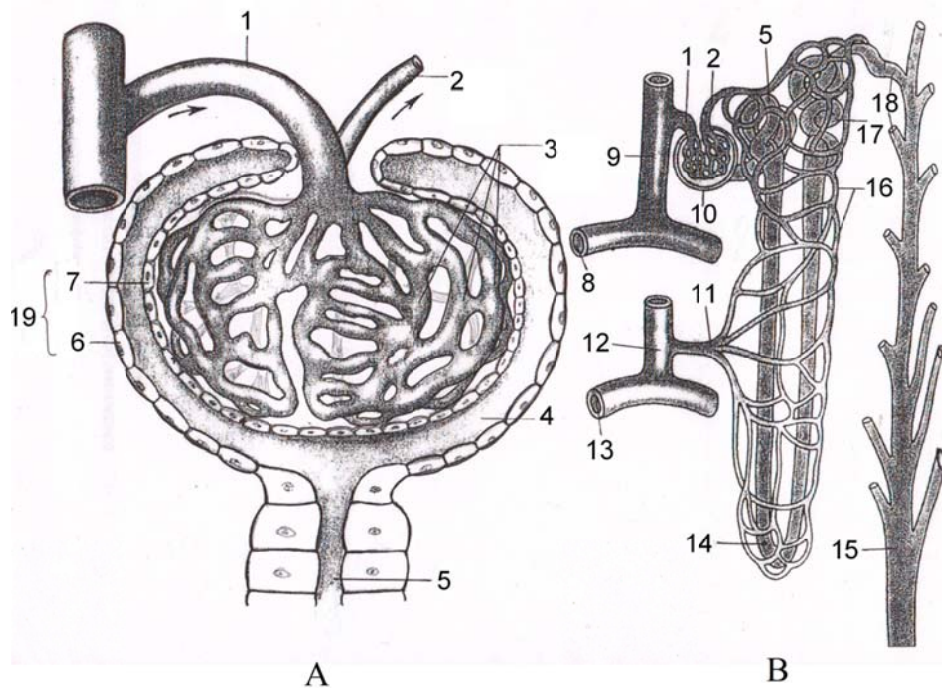


Figure 5 — Nephron

A — The structure of corpusculum renale (scheme): 1 — arteriola glomerularis afferens (vas afferens); 2 — arteriola glomerularis efferens (vas efferens); 3 — rete capillare glomerulare; 4 — lumen capsulae; 5 — pars proximalis tubuli nephroni; 6 — paries externa; 7 — paries interna; 19 — capsula glomeruli.

B — The structure of nephron and the relationship with blood vessels (scheme): 1 — arteriola glomerularis afferens (vas afferens); 2 — arteriola glomerularis efferens (vas efferens); 5 — pars proximalis tubuli nephroni; 8 — a. arcuata; 9 — a. interlobularis; 10 — corpusculum renale; 11 — venules capillary network cortex renalis; 12 — v. interlobularis; 13 — v. arcuata; 14 — ansa nephroni; 15 — ductuli papillares; 16 — capillary network of kidney; 17 — pars distalis tubuli nephroni; 18 — tubulus renalis colligens

A wonderful network of the kidney, rete mirabile renis, is a specific distribution of the blood vessels of the renal corpuscle, in which an arteriol is formed from the capillary network of the renal corpuscle, rather than the venule. From the arteriolus that brings the blood to the capillary glomerulus. Then, from the

capillary glomerulus, the blood flows not into the venule, but into the outgoing arteriol, which then forms a secondary capillary network. And from the secondary capillary network, the blood enters the venules.

There are three forms of formation of the renal tree (pelvis renalis), reflecting the successive stages of its development:

1. *Embryonic*, in the embryo — small kidney cups flow directly into the renal pelvis; large cups absent;

2. *Fetal*, in the fetus — a large number of small and large renal calyces, immediately passing into the ureter; pelvis absent;

3. *Mature*, in the newborn — small cups merge into large cups, passing into the renal pelvis, flowing into the ureter; usual shape.

Fornical apparatus of the kidney.

The renal apparatus of the kidney is a complex of structures that are functionally related to each other and ensure the excretion of urine from the intrarenal urinary tract of the kidney (papillary ducts in particular) into the cavity of the small calyx. *Fornix* is an enlarged part of a small calyx, a depression between the papilla of the pyramid and the initial part of the cup. In the wall of small cups there is a number of muscles that regulate the process of urine entering from the papillary ducts into the cavity of the small calyx:

1) the muscle lifting the arch (m.levator fornicis) and the longitudinal muscle of the small calyx (m. longitudinalis calycis) — widen the cavity of the small calyx, contributing to the intake and accumulation of urine;

2) arch compressor (m. sphincter fornicis) and spiral muscle of small calyx (m. spiralis calycis) — narrows calyx and empties it.

Blood supply to the kidney

Arteries:

1) the renal artery, a.renalis departs from the abdominal part of the aorta (aorta abdominalis) at level II of the lumbar vertebra. In the area of the kidneys it is divided into the anterior, a.renalis anterior and posterior branches, a.renalis posterior;

2) the anterior branch is divided into four segmental arteries: anterior, anterior superior, anterior inferior and inferior; the posterior branch passes into the posterior segmental artery;

3) segmental arteries, aa. segmentales are divided into interlobar arteries, aa.interlobares, lying between the pyramids;

4) from the interlobar arteries depart arc arteries, aa.arquatae, which lie above the bases of the pyramids and give rise to multiple interlobular arteries, aa.interlobulares, lying in the cortex, between the lobules of the kidneys;

5) from the interlobular arteries in the folded part depart the bringing arterioles, arteriolae glomerulares afferents. In the renal corpuscle they branch out and form a capillary glomerulus. The outgoing arteriol, arteriolae glomerulares efferentes, which again breaks up into capillaries surrounding the renal tubules, form the glomerulus, forming a capillary network of the kidney parenchyma.

Veins:

— venous anatomy corresponds to the division of the renal arteries: vv. interlobulares, vv. arcuatae, vv. interlobares, vv. segmentales, v. renalis — v. cava inferior, inferior vena cava. In addition, interlobular veins are poured in star veins, vv. stellatae, which are formed from small veins of the cortex and the fibrous capsule of the kidney.

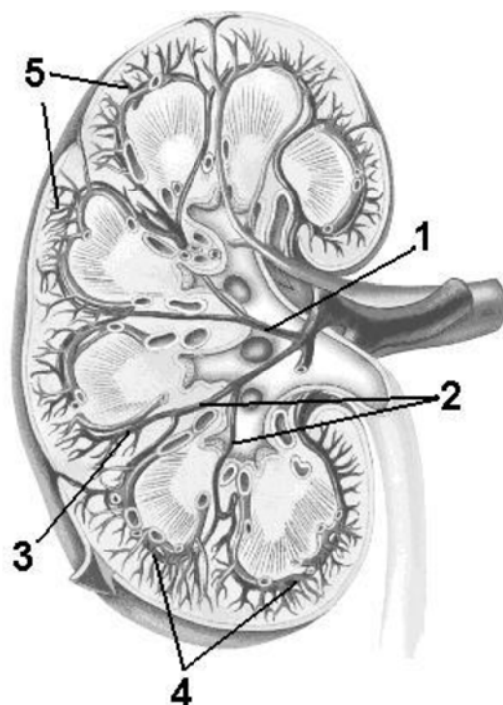


Figure 6 — Blood supply to the kidney:

1 — aa. segmentales; 2 — aa. lobares; 3 — aa. interlobares; 4 — aa. arcuatae;
5 — aa. interlobulares

Innervation of the kidney

1. Afferent innervation is carried out by sensitive fibers of the anterior branches of the inferior thoracic and upper lumbar spinal nerves, as well as the rr.renales n.vagi fibers.

2. Sympathetic innervation is provided by ganglia aortorenalia from plexus coeliacus along the course of the renal arteries.

3. Parasympathetic innervation is carried out by the fibers of rr.renales n.vagi.

Lymphatic vessels

Lymphatic vessels of the kidney are divided into superficial, envelopes of the kidney and covering the peritoneum from the capillary nets, and deep located between the lobules of the kidneys. The two systems mostly merge in the renal sinus and then follow the course of the renal blood vessels to the regional lumbar nodes, Inn.lumbales. Also, the outflow of lymph can occur in nodi aortici laterales, cavales laterales, coeliaci, iliaci interni, phrenici inferiores.

Ureter

Ureter is a paired organ that provides urine from the kidney to the bladder. It looks like a tube, about 30 cm long and 4–7 mm in diameter.

Holotopia:

— located in the abdominal cavity and in the cavity of the small pelvis.

Skeletaltopia:

— is located at the level of L₂–S₄.

Sintopia:

— the abdominal cavity: the ureter lies on the anterior surface of the large lumbar muscle, m.psoas major; when passing into the cavity of the small pelvis crosses the iliac vessels, also the right ureter crosses the radix mesenterii, and the left one — mesocolon sigmoideum;

— cavity of the small pelvis:

A) the ureters descend along the walls of the pelvic cavity anterior to a. et v. iliaca interna, following to the bottom of the bladder.

B) in men the ureter is located outside of the vas deferens, then crosses it and enters the bladder below the upper edge of the seminal vesicle.

C) in women, the ureter passes behind the ovary, then laterally rounds the cervix and lies between the anterior wall of the vagina and the bladder.

External structure

1. Part of the ureter:

— pars abdominalis;

— pars pelvina, about 4 cm;

— pars intramuralis (located in the wall of the bladder), about 2 mm.

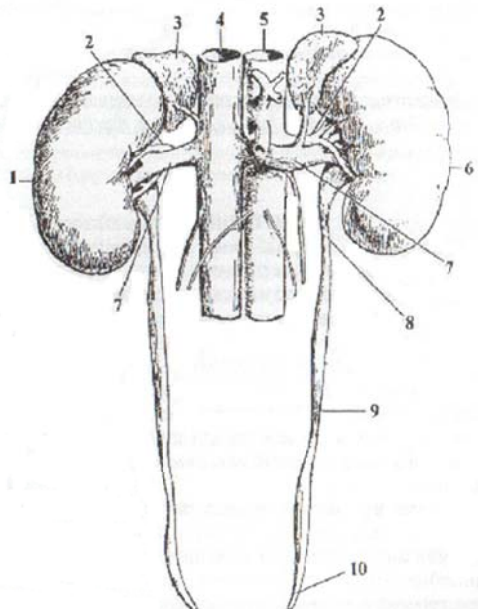


Figure 7 — Kidney, ureter (front):

1 — ren dextrum; 2 — a. renalis; 3 — glandula suprarenalis; 4 — v. cava inferior;

5 — pars abdominalis aortae descendens; 6 — ren sinistrum; 7 — v. renalis;

8 — renal narrowing; 9 — pelvic narrowing; 10 — interstitial narrowing

2. Narrowing of the ureter:

— renal — at the beginning of the ureter, when the pelvis passes into the ureter;

— pelvic — at the place of transition into the cavity of the small pelvis (above linea terminalis);

— interstitial (inside the wall) — in the pars intramuralis (the place of the confluence in the bladder is called the juxtavezic angle).

Shells of the ureter:

1. Mucous membrane, tunica mucosa:

— transitional, multilayer epithelium;

— longitudinal folds, plicae longitudinales.

2. Muscle shell, tunica musculares:

— internal layer — longitudinal;

— external words — circular;

— in the lower third, another layer is selected — longitudinal.

3. Outer shell: adventitia. In relation to the peritoneum, the ureters are located retroperitoneally.

Blood supply of ureters.

Arteries:

— rr. ureterici a. renalis et rr. ureterici a. testicularis (ovarica) from pars abdominalis aortae descendens;

— rr. ureterici a. rectalis media et rr. ureterici aa. vesicales inferiors of a. iliaca interna.

Veins:

— the outflow of blood occurs on the same veins in v. cava inferior and v. iliaca interna.

Innervation of ureters

1) Afferent innervation is provided by the sensitive fibers of the anterior branches of the lower lumbar and upper sacral spinal nerves, and the abdominal part of the ureter is innervated by sensitive rr. ureterici n. vagi fibers.

2) Parasympathetic innervation in the abdominal part is ensured by rr. ureterici n. vagi, and in the pelvic and interstitial nn. splanchnici pelvini of the nuclei parasympathici sacrales.

3) Sympathetic innervation is provided from plexus renalis from plexus coeliacus, plexus hypogastricus inferior.

Lymphatic vessels

Lymph flows mainly in the nodi lymphatici lumbales, aortici laterals, cavales laterals, iliaci interni, coeliaci, paravesicales, pararectales.

Bladder

Bladder, vesica urinaria, (Greek — cistis) is an organ with a volume of 250-500 ml, serving to accumulate urine and excrete it.

Holotopia:

— is located in the cavity of the small pelvis.

Skeletaltopia:

— unfilled bladder does not rise above the pubic symphysis, filled — appears above it. Between the bladder and pubic symphysis there is space — *spatium prevesicale*, filled with fatty tissue.

Sintopia:

— there is pubic symphysis in front;

— in men, the rectum, seminal vesicles and ampullae of the vas deferens ducts are in the back of the bladder; from above — loops of the small intestine; from below — the prostate gland;

— in women, the uterine cervix and the vagina are to the bladder behind; on top — the body and the bottom of the uterus; from below — urogenital diaphragm.

Parts of the bladder:

1) apex of the bladder, *apex vesicae*, — narrowed antero-superior part, to which from the umbilicus there is a median umbilical ligament, *lig. umbilicale medianum*, which is an overgrown urinary duct, *urachus*;

2) the body of the bladder, *corpus vesicae*, — the middle part;

3) the bottom of the bladder, *fundus vesicae*, — the lower, slightly enlarged part;

4) the neck of the bladder, *cervix vesicae*, which has an internal urethra, an *ostium urethrae internum*. This is the beginning of the urethra. Also from the pubic symphysis to the side of the neck are the connective tissue strands that form the *pubic-vesicle ligament*, *lig. pubovesicale*.

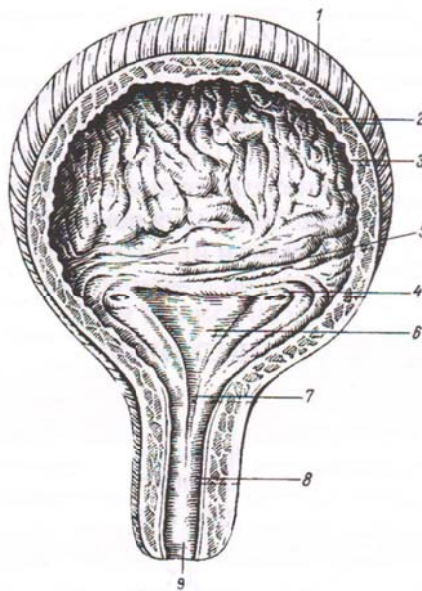


Figure 8 — Female bladder and urethra:

- 1 — vesica urinaria; 2 — tun. muscularis; 3 — tun. mucosa; 4 — ostium ureteris;
5 — plica interureterica; 6 — trigonum vesicae; 7 — ostium urethrae internum;
8 — urethra; 9 — ostium urethrae externum

Membranes of the bladder:

1. Mucous membrane, tunica mucosa:

— well expressed, pinkish color, covered with multilayer (flat) transitional epithelium;

— the submucosa, tela submucosa, is absent only in the area of the triangle of the bladder, due to which the mucous and muscular membranes coalesce;

— *triangle of the bladder (Lieto), trigonum vesicae*, located on the posterior wall of the bladder between the orifices of the ureters, the ostium ureteris, and the inner opening of the urethra, the ostium urethrae internum. There are no folds of the mucous membrane.

2. Muscle shell, tunica muscularis:

— outer and inner layers — longitudinal, and medium — circular;

— in the region of the bladder neck, the middle layer forms a compressor of the bladder (internal urethral sphincter), m. sphincter vesicae (m. sphincter urethrae internus);

— the muscular membrane of the bladder, with the exception of the internal sphincter of the urethra, generally forms the muscle that ejects the urine, m. detrusor urinae.

3. Outer shell:

— adventitia or serosa (peritoneum). An empty bladder has an adventitia. In relation to the peritoneum empty — retroperitoneal; in the filled state — mesoperitoneally;

— when the peritoneum passes from the walls of the bladder to the organs, the following are formed:

A) in men — rectal-vesicular cavity, excavation rectovesicalis;

B) in women — the vesicle-uterine cavity, excavation vesicouterina.

Blood supply of the bladder:

Arteries:

— aa. vesicales superiores of a. umbilicalis of a. iliaca interna;

— a. vesicales inferior of a. iliaca interna.

Veins:

— the outflow of venous blood from the plexus venosus vesicalis occurs through the same veins in v. iliaca interna.

Innervation of the bladder

1) Afferent innervation is provided by the sensitive fibers of the anterior branches of the sacral spinal nerves.

2) Parasympathetic innervation — nn. splanchnici pelvini from the nuclei parasympathici sacrales.

3) Sympathetic innervation — plexus hypogastricus inferior.

Lymphatic vessels

The lymph flow mainly in the nodi lymphatici paravesicales, pararectales, lumbales, iliaci interni.

MALE GENITAL ORGANS

The organs of the male reproductive system, organa genitalia masculina, are divided into external and internal by location:

1. External male genital organs, organa genitalia masculina externa:
 - pubic elevation, mons pubis;
 - scrotum; scrotum;
 - male penis, penis.
2. Internal male genital organs, organa genitalia masculina interna:
 - testicle, testis;
 - epididymis, epididymis;
 - the vas deferens, ductus deferens;
 - the ejaculatory duct, ductus ejaculatorius;
 - seminal vesicles, vesiculae seminales;
 - spermatic cord, funiculus spermaticus;
 - prostate gland, prostate;
 - bulbourethral (Cooper's) glands, glandulae bulbourethrales.

EXTERNAL MALE GENITAL ORGANS

Pubic elevation

Pubic elevation, mons pubis is the skin covered with hair, located in the area of the pubic symphysis and upper branches of the pubic bones.

Scrotum

Scrotum — dermal-connective tissue-muscle formation, which is a receptacle for testicles with appendages and lower section of spermatic cord.

The cavity of the scrotum is divided into two halves by the sagittally moving scrotum septum scroti; at the top it is fixed to the root of the penis, on the rest stretch to the stitch of the scrotum.

The scrotum seam, raphe scroti, corresponds to the septum of the scrotum and passes to the perineum in the form of a seam of the perineum, raphe perinei.

In the scrotum, 7 layers (membranes) are identified, which are also called testicular membranes.

Layers of the scrotum:

1. Skin, cutis scroti — thin, wrinkled, dark (due to a large amount of pigment), covered with rare hair; contains a lot of sebaceous and sweat glands.
2. Fleshy shell, tunica dartos — derivative of subcutaneous fat (but does not contain fat). It is represented by a dense connective tissue plate, which contains elastic fibers and smooth-muscle tissue.

Due to its reduction, the skin of the scrotum can significantly contract and pull the testicles to the pubic elevation (when the temperature of the environ-

ment decreases, and when the temperature rises, on the contrary — it significantly stretches, contributing to the lowering of the testes), these processes play an important role in maintaining the optimum temperature necessary for a full spermatogenesis (N — 33–34°C).

3. External seminal fascia, fascia spermatica externa — continuation of the superficial (subcutaneous) fascia of the abdomen.

4. The fascia of the muscle that lifts the testicle, fascia cremasterica — the continuation of the fascia's own fascia.

5. The muscle lifting the testicle, m.cremaster — the continuation of the beams of the inner oblique and transverse abdominal muscles.

6. Internal seminal fascia, fascia spermatica interna — continuation of the transverse fascia of the abdomen.

7. The vaginal membrane, tunica vaginalis (derivative of the peritoneum) consists of two sheets:

— *parietal plate, lamina parietalis* (tightly fused to the inner seminal fascia);

— *visceral plate, lamina visceralis* (covers the testis and appendage, tightly fused with the belly coat).

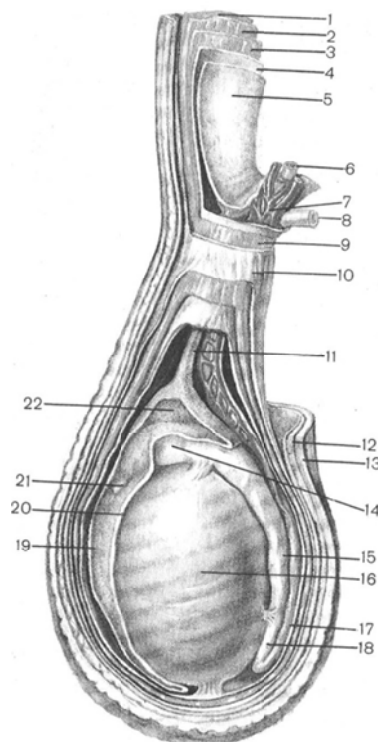


Figure 9 – Shell testis (scrotum) and spermatic cord:

- 1 — m. obliquus externus abdominis; 2 — m. obliquus internus abdominis;
 3 — m. transversus abdominis; 4 — fascia transversalis; 5 — peritoneum; 6 — a. testicularis;
 7 — plexus venosus pampiniformis; 8 — ductus deferens; 9 — m. cremaster;
 10 — fascia spermatica externa; 11 — vestigium processus vaginalis; 12 — tun. dartos;
 13 — cutis; 14 — caput epididymidis; 15 — corpus epididymidis; 16 — testis;
 17 — ductus deferens; 18 — cauda epididymidis; 19 — tun. vaginalis testis (lam. parietalis);
 20 — tun. vaginalis testis (lam. visceralis); 21 — appendix epididymidis;
 22 — serous cavity testis

Blood supply to the scrotum:

Arteries:

— rr. scrotales anteriores — branches aa. pudendae externae from a. femoralis;

— rr. scrotales posteriores — branches aa. perinealis from a. pudenda interna, from a. iliaca interna.

Veins:

— vv. scrotales anteriores, flow into v. femoralis;

— vv. scrotales posteriores, flow into v. iliaca interna.

Innervation of the scrotum

The innervation of the skin of the scrotum is provided by the fibers:

— nn. scrotales anteriores — branches of n. ilioinguinalis et r. genitalis n. genitofemoralis of plexus lumbalis;

— nn. scrotales posteriores — branches of n. pudendus from plexus sacralis;

Innervation of the fleshy shell is provided by r. genitalis n. genitofemoralis from plexus lumbalis.

Lymph outflow — is carried out in nodi limphatici inguinales superficiles.

Male penis

The penis serves to remove urine from the bladder and throw the semen into the woman's genital tract.

The penis consists of two cavernous bodies and one spongy:

1. The cavernous body of the penis, corpus cavernosum penis, — paired formations of cylindrical shape with pointed ends:

— the posterior ends of the cavernous bodies diverge and form *the legs of the penis, crus penis*, which attach to the lower branches of the pubic and branches of the ischium bones;

— cavernous bodies are covered with a common belly coat, *tunica albuginea corporum cavernosum*, which fuses along the median line and forms a *septum penis*.

In front, both cavernous bodies are connected by their medial surfaces. At the same time on the upper (front) and lower (rear) sides of the fused surfaces, the corresponding furrows are formed — *sulcus superior (anterior) penis and sulcus inferior (posterior) penis*. The upper furrow is filled with the back vessels and nerves of the penis, the spongy body is located in the lower furrow.

2. The spongy body of the penis, corpus spongiosum penis, is unpaired, cylindrical in shape, flattened in the anteroposterior direction and is permeated throughout the urethra.

The posterior end of the spongy body is thickened and forms *a bulb of the penis, bulbus penis*, which is adjacent to the urogenital diaphragm. The anterior end of the spongy body passes into the glans penis, the posterior edge of which is thickened, forming *the head crown, corona glandis*. Between the body of the penis and the head there is a shallow furrow — *the neck of the head, collum glandis*.

The head opens *the external opening of the urethra, ostium urethrae externum*.

At the base of the head, the skin is collected in the form of a fold that covers the head and is called *the foreskin of the penis, preputium penis*.

On the lower surface of the head, the foreskin is connected to the head by *the bridle of the foreskin, frenulum preputii*, which extends posteriorly into *the seam of the penis, the raphe penis*, and the latter, in turn, passes to the scrotum and perineum.

Between the head of the penis and the inner leaf of the foreskin is a slit-shaped space — *cavitas preputialis*, in which a preputial lubricant accumulates, *smegma preputii*, a mixture of the secretion of the sebaceous and sweat glands with depleted epithelium.

The glands of the prepuce, glandulae preputiales, are located on the inner surface of the foreskin and around the crown of the head.

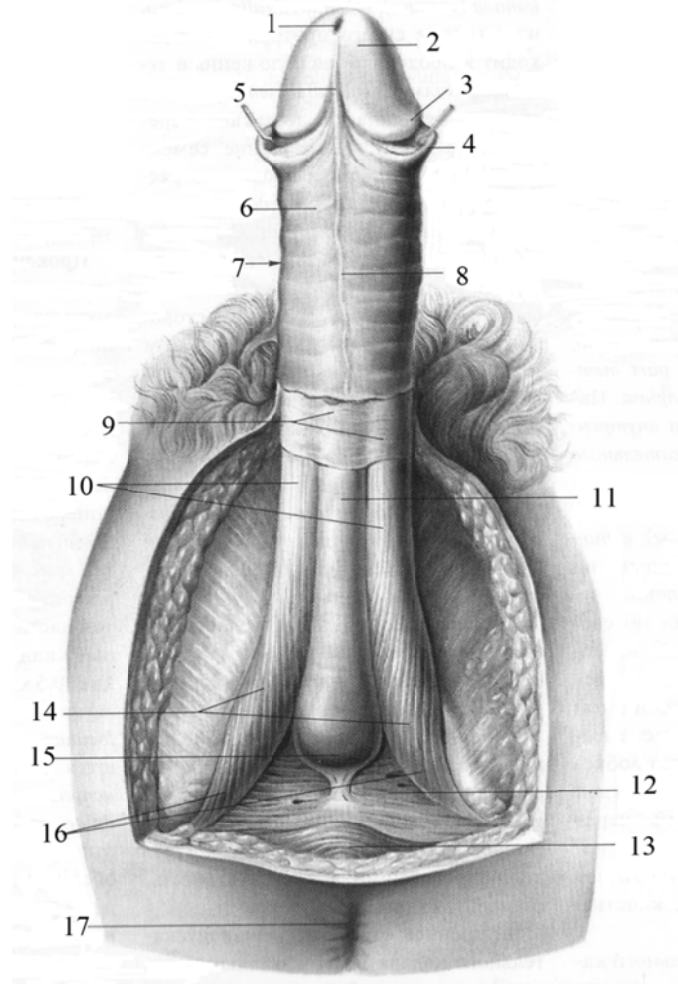


Figure 10 — Penis:

- 1 — ostium urethrae externum; 2 — glans penis; 3 — corona glandis; 4 — preputium penis;
5 — frenulum preputii; 6 — integumentum commune; 7 — corpus penis; 8 — raphe penis;
9 — fasciae penis superficialis et profunda; 10 — corpora cavernosa penis;
11 — corpus spongiosum penis; 12 — m. transversus perinei profundus;
13 — m. sphincter ani externus; 14 — m. ischiocavernosus; 15 — bulbus penis;
16 — radix penis; 17 — anus

The cavernous and spongy bodies consist of numerous connective tissue rails branching off from the belly shell — *trabeculae, trabeculae corporis cavernosi et spongiosi*, which isolate inside the blood-filled cavities — *cells, cavernae corporis cavernosi et spongiosi*.

Blood supply of cells of cavernous and spongy bodies is carried out by *curved arteries, aa. helicinae*. Venous outflow occurs through a deep dorsal vein and deep veins of the penis.

Fascia of the penis:

1. The superficial fascia of the penis, *fascia penis superficialis*, is a continuation of the superficial fascia of the perineum and the anterior wall of the abdomen, as well as the fleshy shell of the scrotum. It is strongly associated with the skin of the penis.

2. The deep fascia of the penis, *fascia penis profunda*, is a continuation of its own fascia of the abdomen and thighs, is located outside of the belly shell of the cavernous bodies and covers them together with the spongy body.

Bundles of the penis:

1. The superficial ligament suspending the penis, *lig. suspensorium penis superficiale*, is an extension of the superficial fascia of the anterior abdominal wall to the superficial fascia of the penis.

2. Deep hanging (slinging) ligament of the penis, *lig. suspensorium penis profundum (fundiforme)*, triangular in shape, comes from the lower part of the pubic symphysis and interlaces in the belly shell of the back of the cavernous bodies.

Blood supply to the penis:

Arteries:

— the skin and membranes of the penis are supplied *rr. scrotales anteriores* from *aa. pudenda externa* and *a. dorsalis penis* from *a. pudenda interna*;

— cavernous and spongy bodies — *a. profunda penis* and *a. dorsalis penis* from *a. pudenda interna*;

— the bulb of the penis — *a. bulbi penis*, the spongy body and the urethra — *a. urethrales* (branch of the internal sexual artery).

Veins:

— venous outflow from the penis occurs along *v. dorsalis penis profunda* and along *v. bulbi penis* into *plexus venosus vesicalis*, and then into *v. iliaca interna*;

— through *vv. profundae penis* into *v. genitalis interna*.

Lymph outflow: occurs into *n. inguinalis superficialis* and *n. iliaca interna*.

Innervation

1. Sensitive:

— *nn. scrotales anteriores* — branches of *n. ilioinguinalis* et *r. femoralis n. genitofemoralis* of *plexus lumbalis* (innervation of the skin in the region of the root of the penis);

— *n. dorsalis penis* of *n. pudendus*, a branch of the sacral plexus.

2. Sympathetic innervation comes from the *plexus gipogastricus inferior*.

3. Parasympathetic innervation is provided by *nn. splanchnici pelvini* from the *nuclei parasympathici sacrales*.

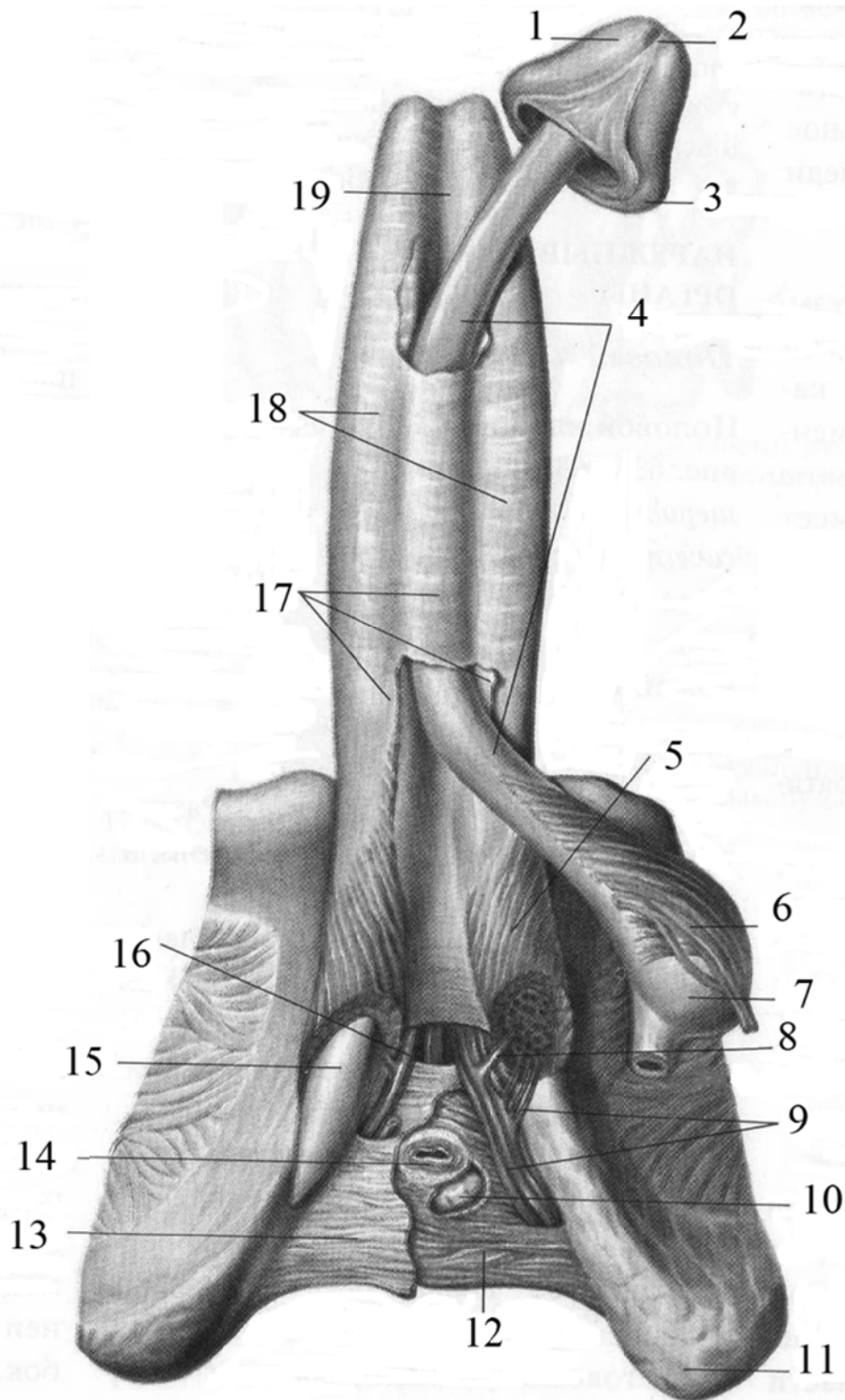


Figure 11 — Corpus cavernosum and spongiosum penis:

- 1 — glans penis; 2 — ostium urethrae externum; 3 — corona glandis;
 4 — corpus spongiosum penis; 5 — m. ischiocavernosus; 6 — m. bulbospongiosus;
 7 — bulbus penis; 8 — a. profunda penis; 9 — vv. profundae penis;
 10 — glandula bulbourethralis; 11 — tuber ischiadicum; 12 — m. transversus perinei profundus;
 13 — fascia diaphragmatis urogenitalis inferior; 14 — m. sphincter urethrae;
 15 — crus penis; 16 — a. dorsalis penis; 17 — fascia penis profunda;
 18 — corpora cavernosa penis; 19 — fascies urethralis

INTERNAL MALE GENITAL ORGANS

Testicle

Testicle, testis (didymis), (Greek orchis) — male sexual gland, located in the scrotum.

The testicle is a gland of mixed secretion: the exocrine function consists in the formation of male sex cells-spermatozoa; endocrine function — in the synthesis of male sex hormones — androgens (testosterone).

In the testicle distinguish:

— two edges — anterior, margo anterior (free); posterior, margo posterior (bordering on the epididymis);

— two surfaces — medial, facies medialis (flattened); lateral, facies lateralis (more convex);

— two extremities — the upper, extremitas superior, on which the head of the epididymis and appendix testis are located; the lower, extremitas inferior.

On the posterior margin are the gates of the testicle, through which the nerves and arteries penetrate, and the protruding testicles of the testicle, veins and lymphatic vessels emerge.

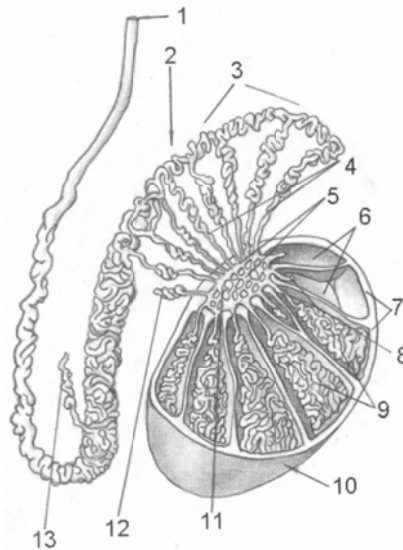


Figure 12 – Testis and epididymis:

- 1 — ductus deferens; 2 — epididymis; 3 — ductus epididymidis; 4 — ductuli efferentes testis;
5 — rete testis; 6 — septula testis; 7 — tunica albuginea; 8 — tubuli seminiferi recti;
9 — tubuli seminiferi contorti; 10 — testis; 11 — mediastinum testis;
12 — ductulus abberans superior; 13 — ductulus abberans inferior

The structure of the testis

Outdoors, the testicle is covered with a dense fibrous belly coat, tunica albuginea, under which is the egg substance, parenchyma testis.

Numerous septa, septulae testis, which divide the gland into lobules of the testicle, lobuli testis (100–300), leave the parenchyma from the belly to the pa-

renchyma. The fissures of the testicle are directed from the anterior margin and lateral surfaces to the posterior margin of the testicle, in the upper part of which form the mediastinum testis, combining with the belly. In the mediastinum of the testicle, Leydig interstitial cells are located, which produce male sex hormones, androgens.

In the lobes of the testicle there are 2–3 convoluted seminiferous tubules, tubuli seminiferi contortii, in which male sex cells are formed — spermatozoa.

The convoluted seminiferous tubules at the apices of the lobules merge and form the direct seminiferous tubules, tubuli seminiferi recti, when they join, in the mediastinum region of the testicle, a network of testicles is formed, rete testis. From this network, up to 12–15 endometrial tubules are formed, ductuli efferentes testis, which, perforating the belly, enter the head of the epididymis and flow into the duct of the epididymis, ductus epididymis, and the latter continues into the vas deferens, ductus deferens. The vas deferens, entering the thickness of the prostate gland, merges with the excretory duct of the seminal vesicle, ductus excretorius, forming the ejaculatory duct, ductus ejaculatorius. The latter perforates the prostate and opens with an opening in the prostate part of the urethra, on the side of the seed hillock. Starting with direct seminal tubules this is the way to excrete sperm.

Shells of the testis:

— this is 7 shells of the scrotum.

Epididymis

The epididymis is located along the posterior margin and the upper end of the testicle.

It distinguishes:

1. The head of the epididymis, caput epididymis, broad and rounded, protrudes beyond the upper end of the testicle. Sometimes on the head of the epididymis there are pendants of the appendix epididymis (rudimentary process), and paradidymis (these formations are well expressed in children under 10 years old, and then gradually reduce) can be seen posterior from the epididymis head.

2. The body of the epididymis, corpus epididymis — is adjacent to the posterior margin of the testicle. Between the anterior surface of the epididymis and the posterior margin of the testicle is the sinus epididymis, lined with a visceral plate of the vaginal shell of the testicle and open to the lateral side. Above and below the sinus of the epididymis is limited by the upper and lower ligaments of the epididymis, ligg. epididymis superius (connects the upper end of the testicle with the head of the epididymis) et inferius (comes from the lower part of the posterior margin of the testicle and attaches to the epididymis in the area of its body's transition into the tail).

3. Tail of the epididymis, cauda epididymis — continues into the duct of the epididymis, ductus epididymis, and then into the vas deferens, ductus deferens.

In the region of the body and tail of the epididymis, blindly terminating upper and lower divergent protrusions may occur, ductulus aberrans superior et inferior (remnants of the Wolffian body).

In each lobe of the epididymis from the mediastinum of the testicle comes the outgoing tubule of the testicle, ductulus efferentis testis, which then flows into the duct of the epididymis, ductus epididymis (begins in the head of the epididymis), and further into the vas deferens, ductus deferens.

Blood supply of the testis and epididymis:

Arteries:

— a. testicularis of pars abdominalis aortae descendens;

— a. ductus deferentis from a. iliaca interna.

Veins:

— occurs in the lobate venous plexus, plexus venosus pampiniformis, then in the v. cava inferior (on right) and v. renalis (on left).

Innervation: in the course of the testis and its epididymis, nerve fibers form the plexus testicularis and plexus epididymis.

1. Afferent innervation is provided by sensitive fibers passing through the plexus aorticus abdominalis to the upper lumbar spinal nodes.

2. Parasympathetic innervation — fibers nervi splanchnici pelvini from the nuclei parasympathici sacrales.

3. Sympathetic innervation — from plexus aorticus abdominalis along the arteries, blood supplying the testicle and its epididymis.

Lymph outflow: occurs predominantly in nodi lymphatici lumbales.

Vas deferens

The vas deferens, ductus deferens, is a direct extension of the duct of the epididymis.

Topographically, in the duct there are 4 parts:

1. The testicle, pars testicularis — is located at the posterior margin of the testicle, medial to its epididymis.

2. The rope part, pars funicularis — goes in the spermatic cord to the superficial inguinal ring.

3. The inguinal part, pars inguinalis — lies in the inguinal canal.

4. The pelvic part, pars pelvina — begins from the place of exit from the deep inguinal ring, goes along the lateral wall of the small pelvis (retroperitoneally) down and back. Having reached the bladder, the duct turns forward and approaches the base of the prostate gland. In the distal part of the duct there is an extension — the ampulla of the vas deferens, *ampulla ductus deferentis*, which is intended for the accumulation and storage of spermatozoa.

The vas deferens, entering the thickness of the prostate gland, merges with the excretory duct of the seminal vesicle, *ductus excretorius*, forming the ejaculatory duct, *ductus ejaculatorius*. The latter perforates the prostate and opens with an opening in the prostate part of the urethra, on the side of the seed hillock.

Shells of the vas deferens:

1. Mucous, tunica mucosa — has 3–5 longitudinal folds. In the area of the ampoule, the mucosa forms bayonet protrusions — *ampulla diverticula, diverticulum ampullae*.

2. Muscular, tunica muscularis — is represented by the inner and outer longitudinal and middle circular layers of smooth muscle fibers.

3. Adventitia, tunica adventitia — consists of connective tissue and elastic fibers. It contains the vessels and nerves of the duct.

The spermatic cord

The spermatic cord, funiculus spermaticus is a paired, rounded stitch that runs from the deep inguinal ring to the upper end of the testicles, is formed as a result of lowering the testicles from the abdominal cavity to the scrotum. He hangs an egg and lifts it to the inguinal ring, thanks to the same-named muscle, *m. cremaster*, which is located in its composition.

Parts of the spermatic cord:

— scrotal, pars scrotalis;

— inguinal, pars inguinalis.

In the spermatic cord there are:

— the vas deferens, its artery and vein, ductus deferens and a. et v. ductus deferentis;

— the testicular artery, a. testicularis and the lobar plexus, plexus pampiniformis, continuing into the testic vein, v. testicularis;

— nerve plexuses of the vas deferens and testis, plexus nervorum deferentialis et testicularis;

— lymphatic vessels, vasa lymphatica.

All elements of the spermatic cord are enclosed in shells:

1. Internal seminal fascia, fascia spermatica interna;

2. Muscle lifting the testicle, *m. cremaster*;

3. Fascia of the muscle that lifts the testicle, fascia cremasterica;

4. External seminal fascia, fascia spermatica externa.

Outside (in the scrotal part) is a fleshy shell, *tunica dartos* and skin, *cutis*.

Seminal vesicles

Seminal vesicles, vesiculae seminales — are located in the cavity of the small pelvis, laterally from the vas deferens, from above the prostate gland, behind and from the bottom of the bladder and in front of the ampulla of the rectum. The upper part of the seminal vesicles is covered by the peritoneum.

On the cut, the seminal vesicle consists of numerous chambers communicating with each other, but in fact it is a single, strongly curved tubule with lateral protrusions, up to 12 cm long (in straightened condition).

Parts of the seminal vesicle:

1. The base, basis — the upper dilated end, covered with the peritoneum.

2. The body, corpus.

3. The lower end, *extremitas inferior*, is narrowed and continues into the excretory duct, *ductus excretorius*, which merges with the distal end of the *vas deferens* and forms a common ejaculatory duct, *ductus ejaculatorius*. The latter is guided downward in the thickness of the prostate gland, medially and anteriorly, and opens in the prostate part of the urethra, on the side of the seed hillock.

Shells of the seminal vesicle:

1. Mucous, *tunica mucosa* — has folds, due to a well expressed submucosa base.

2. Muscular, *tunica muscularis* — represented by internal — circular and outer — longitudinal layers of muscle fibers.

3. Adventitia, *tunica adventitia*.

Seminal vesicles secrete a viscous protein containing a liquid that forms the liquid part of the sperm. This liquid is an alkaline reaction with an optimal set of macro and microelements to ensure the mobility of the spermatozoa. Also in its composition are fructose (energy component for spermatozoa) and a number of enzymes that dissolve the lecithin shell of spermatozoa, activating their mobility.

Blood supply of the *vas deferens* and seminal vesicles:

Arteries: aa. *ductus deferentis*, *vesicalis inferior* and *rectalis media* (branches of a. *iliaca interna*);

Veins: venous outflow occurs on the same veins in *plexus venosus vesicalis* et *plexus venosus prostaticus* — in v. *iliaca interna*.

Innervation: in the course of the organs, nerve fibers form the plexus of the *vas deferens* and the seminal vesicles.

1. Afferent:

— the *vas deferens* duct is provided with sensitive fibers passing through the *plexus aorticus abdominalis* to the lower lumbar spinal nodes;

— in seminal vesicles — sensitive fibers of the sacral spinal nerves;

2. Parasympathetic innervation is provided by *nervi splanchnici pelvini* fibers from the nuclei parasympathic sacrales;

3. Sympathetic innervation is from the *plexus hypogastricus inferior* along the arteries, blood supplying the *vas deferens* and seminal vesicles.

Lymph outflow occurs in the internal iliac lymph nodes, *nodi lymphatici iliaci interni*.

Prostate

The prostate gland, *prostate*, is an unpaired organ of glandular and smooth muscle tissue, in shape and size resembling a chestnut. Located in the lower part of the pelvic cavity under the bladder, between it, the anterior wall of the rectum and the genitourinary diaphragm; and seminal vesicles are located laterally and medially are ampullae of the *vas deferens*.

Through the prostate gland passes the initial section of the urethra and the ejaculatory ducts (permeate it from behind and from above).

In the prostate gland secrete:

1. The base, the basis prostatae, is turned upward to the bottom of the bladder, the seminal vesicles and ampullae of the vas deferens; somewhat flattened.

2. The apex, apex prostatae — faces downward and lies in the anterior part of the genitourinary diaphragm.

3. The front surface, facies anterior — faces the pubic symphysis.

4. The posterior surface, facies posterior — is facing the ampulla of the rectum and is separated from it by the plate of the pelvic fascia — *the rectal-vesicular septum*.

5. Lower-lateral surface, facies inferolateralis — facing the muscle lifting the anus, *m. levator ani*.

6. Right and left lobes, lobus dexter and lobus sinister, which are separated from each other by a barely noticeable furrow and isthmus of the prostate, *isthmus prostatae* (middle or intermediate lobe).

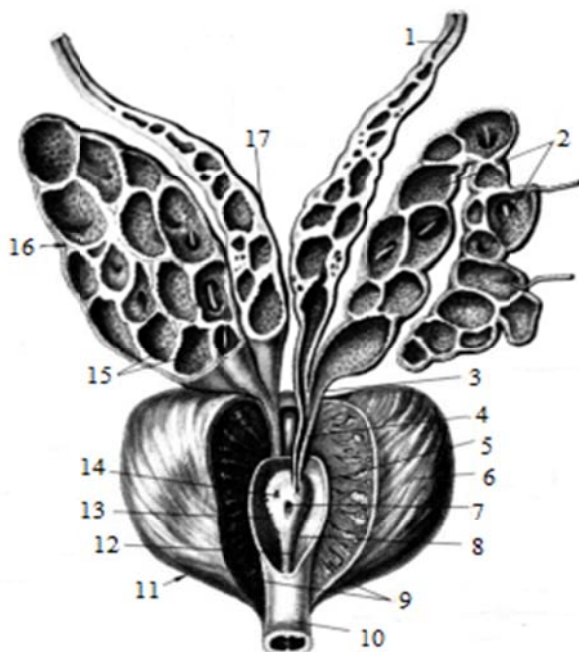


Figure 13 — Prostate and Seminal vesicles:

- 1 — ductus deferens sinister; 2 — vesicula seminalis sinister; 3 — ductus excretorius;
4 — ductus ejaculatorius; 5 — urethra masculine (pars prostatica); 6 — prostate;
7 — utriculus prostaticus; 8 — colliculus seminalis; 9 — capsula prostatica;
10 — urethra masculine (pars membranacea); 11 — facies inferolateralis;
12 — crista urethralis; 13 — sinus prostaticus; 14 — the mouth of ductus ejaculatorius;
15 — tunica mucosa; 16 — vesicula seminalis dexter; 17 — ampulla ductus deferentis

The isthmus is located between the place of entry into its base of the neck of the bladder in front and the ejaculatory ducts — from behind. In its composition is located, laid in the seminal mound of the urethra, utriculus prostaticus.

In practice, the isthmus is of great clinical importance, since in older men it is often hypertrophied and makes it difficult to urinate.

From the pubic symphysis to the anterior and lateral surfaces of the gland follow lateral and medial pubic-prostaticae ligaments, *ligg. puboprostaticae*, and pubic-prostate muscle, *m. puboprostaticus*.

Outside, the prostate gland is covered with a leaf of the pelvic fascia, under which is the capsule of the gland, *capsula prostatica*, and beneath it is the venous plexus, *plexus venosus prostaticus*. From the capsule into the thickness of the gland secrete connective tissue and smooth muscle fibers that make up the stroma of the gland.

The prostate gland consists of parenchyma and muscle substance. Parenchyma in the thickness of the gland is distributed unevenly.

In the anterior part of the prostate smooth muscle tissue predominates, which concentrates around the lumen of the urethra and, integrating with the muscular tufts of the bladder, forms the internal (involuntary) sphincter of the male urethra, *m. sphincter urethrae internum*. Reducing this sphincter prevents urine from entering the urethra during ejaculation.

The glandular tissue is represented by complexes of branched alveolar-tubular glands located in the posterior and lateral sections of the prostate gland in the amount of 30 to 50.

The glandular passages, merging in pairs, form the output prostatic ducts, *ductuli prostatici*, which open into the urethral part of the urethra on both sides of the seminal mound, in the area of the sinus of the urethra.

The glands produce the secret of a slightly alkaline reaction, which dilutes the sperm at the time of ejaculation.

Blood supply of the prostate:

Arteries: — a. prostatica, a. vesicalis inferior and a. rectalis inferior (branches of a. iliaca interna);

Veins: the outflow of venous blood occurs through the same veins in the plexus venosus prostaticus and plexus venosus vesicalis, and from them to v. iliaca interna.

Innervation: along the body, the nerve fibers form the prostatic plexus, plexus prostaticus;

1. Afferent innervation is provided by sensitive fibers of the sacral spinal nerves.

2. Parasympathetic innervation — fibers nervi splanchnici pelvini from the nuclei parasympathici sacrales.

3. Sympathetic innervation comes from the plexus hypogastricus inferior along the arteries that supply blood to the prostate gland.

Lymph outflow occurs in nodi lymphatici iliaci interni.

Bulbourethral glands

Bulbourethral (Cowper's) glands, glandulae bulbourethrales — paired, alveolar-tubular and disposed in the interior of the deep transverse perineal mus-

cles, *m. transversus perinei profundus*, behind the membranous part of the male urethra at a distance of 5 mm from each other.

Glands of dense consistency with slightly bumpy surface, yellowish-brown color, the size of a pea.

The gland has a lobate structure. Moves each segments, when combined, form a common duct bulbourethral gland, *ductus glandulae bulbourethralis*, which are arranged around the fiber outer arbitrary urethral sphincter, *m. sphincter urethrae externum*. The inferior duct goes forward and down, perforates the bulb of the penis and opens in the spongy part of the urethra.

Bulbourethral glands secrete a secret that protects the mucous membrane of the urethra from the irritating effect of urine, and also contributes to the liquefaction of sperm.

Blood supply of bulbourethral gland:

Arteries: — rr. perinealis et aa. bulbi penis from a. pudenda interna (branches of a. iliaca interna).

Veins: the outflow of venous blood occurs through the same veins in v. pudenda interna, and then in v. iliaca interna.

Innervation:

1. Afferent innervation is provided by sensitive n. pudendus fibers from plexus sacralis.

2. Parasympathetic innervation — fibers nervi splanchnici pelvini from the nuclei parasympathici sacrales.

3. Sympathetic innervation comes from the plexus hypogastricus inferior along the arteries that supply blood to the gland.

Lymph outflow occurs in nodi lymphatici iliaci interni.

Male urethra

Male urethra, urethra masculina is an unpaired tubular organ, designed to excrete urine and eject sperm.

Begins in the region of the bladder neck by the internal opening of the urethra, *ostium urethrae internum* (at this point the involuntary internal sphincter of the urethra is located), and ends with the external opening of the urethra, *ostium urethrae externum*, located on the tip of the glans penis.

In its entire length, the urethra penetrates the prostate, the urogenital diaphragm, and the spongy body of the penis.

Topographically, the male urethra is divided into three parts:

1. Pars prostatica.

2. Pars membranacea.

3. Pars spongiosa.

1. Pars prostatica — passes through the prostate gland from top to bottom and forward. On its posterior wall there is an elongated prominence — the crest of the urethra, *crista urethralis*, in the middle of the extension there is a seminal

mound (colliculus), *colliculus seminalis*. On the top of the seed hillock there is a longitudinal depression — *utriculus prostaticus*, on both sides of which the mouth of the ejaculatory ducts opens, *ductuli ejaculatorii*. On the sides of the ridge of the urethra and the seminal mound are the urethral sinuses, *sinus urethrales*, where the prostatic ducts open, *ductuli prostatici*.

2. Pars membranacea is the shortest and narrowest part of the urethra, it passes through the urogenital diaphragm and extends from the tip of the prostate gland to the bulb of the penis. The membranous part and the distal part of the prostate are surrounded by bundles of striated muscle fibers that extend from the deep perineal transverse muscle and form the external arbitrary sphincter of the urethra, *m. sphincter urethrae externum*.

3. Pars spongiosa — is the longest part of the male urethra (15–20 cm) and permeates the spongy body of the penis. It begins in the area of the bulb of the penis and ends at the head with the external opening of the urethra, proximal to which there is an expansion - the scaphoid fossa of the urethra, *fossa navicularis urethrae*.

Throughout, the male urethra is S-shaped, and has three constrictions and three extensions:

1. Constrictions:

- in the area of the internal opening of the urethra, ostium urethrae internum;
- in the membranous part, when passing through the urogenital diaphragm;
- in the area of the external opening of the urethra, ostium urethrae externum.

2. Extensions:

- in the prostate part, pars prostatica;
- in the bulb of the penis, bulbus penis;
- in the head of the penis, in the region of the scaphoid fossa, fossa navicularis.

Bends of the male urethra:

1. Curvatura prepubica — is in front of the pubic symphysis, on the border of the fixed and movable parts of the penis.

2. Curvatura infrapubica — is located under the pubic symphysis, within the fixed part of the urethra.

In clinical practice, these bends are important for the conduct of the catheterization of the bladder: when lifting the penis upward, the front bend is straightened and there remains a sub-lobe bend with a concavity facing the pubic symphysis.

The shells of the male urethra:

1. Mucous membrane, tunica mucosa.

In the spongy part it forms longitudinal folds, *plicae longitudinales*, which cause the urethra extensibility, as well as small indentations-lacunae (crypts) of the urethra, *lacunae uretrales*, into which the glands of the urethra, *glandulae urethrales*, open.

On the anterior wall of the scaphoid fossa, the mucosa forms a transversely located fold — the flap of the scaphoid fossa, *valvula fossae navicularis*, which forms an open front pocket.

2. Muscle shell, tunica muscularis.

It is well developed in the prostatic part of the urethra and is represented there by the inner longitudinal and outer circular layers of smooth muscle fibers.

In the membranous part, it is sharply thinned, and in the spongy part — completely absent.

3. The adventitia, the tunica adventitia, is represented by a thin layer of fibrous connective tissue.

Blood supply of the male urethra:

Arteries:

— the prostatic part — rr. urethrales from a. vesicalis inferior, a. prostatica and a. rectalis media (branches of a. iliaca interna);

— membranous part — a. rectalis inferior; a. urethralis, a. perinealis branch of a. pudenda interna — branch of a. iliaca interna;

— spongy part — a. bulbi penis and a. urethralis; rr. urethrales from a. profunda penis - branch a. pudenda interna

Veins: the outflow of venous blood occurs via the same veins mainly in the plexus venosus vesicalis et plexus venosus prostaticus, as well as in v. pudenda interna, and then in v. iliaca interna.

Innervation:

1. Afferent innervation is provided by sensitive fibers of anterior lower lumbar, upper sacral and coccygeal spinal nerves, as well as n. dorsalis penis, a branch of n. pudendus from plexus sacralis;

2. The efferent innervation of the external urethral sphincter is provided by rr. perineales n. pudendus from plexus sacralis;

3. Parasympathetic innervation — fibers nervi splanchnici pelvini from the nuclei parasympathici sacrales;

4. Sympathetic innervation comes from the plexus hypogastricus inferior along the arteries that supply the urethra.

Lymph outflow occurs in nodi lymphatici inguinales et iliaci interni.

FEMALE GENITAL ORGANS

Female genitals perform endocrine and reproductive functions:

1. The reproductive function consists in the maturation of eggs, the creation of conditions for their fertilization and implantation of the fetal egg; in the bearing of the fetus and in the maintenance of the processes of labor.

2. Endocrine function is provided by female sex hormones (estrogens and progesterone), which affect the development of female genital organs, the formation of secondary sexual characteristics, the regulation of cyclic changes in the body of a woman, as well as the process of conception, gestation and childbirth.

Female genitals, *organa genitalia feminina*, are divided into external and internal by location:

1. External female genital organs, *organa genitalia feminina externa*:

- pubis, mons pubis;
- large labia, *labia majora pudendi*;
- small labia, *labia minora pudendi*;
- large and small glands of the vestibule, *glandulae vestibulares majores et minores*;

- bulb of vestibule, *bulbus vestibuli*;

- clitoris, *clitoris*;

- hymen, *hymen*.

2. Internal female genital organs, *organa genitalia feminina interna*:

- ovary, *ovarium* (*oöphoron* — Greek);

- ovarian appendage, *epoöphoron*;

- fallopian tube, *tuba uterina* (*salpinx* — Greek);

- uterus, *uterus* (*metra* — Greek);

- vagina, *vagina* (*colpos* — Greek).

EXTERNAL FEMALE GENITAL ORGANS

The external female genitalia are located in the anterior crotch, in the region of the genitourinary diaphragm, and include the female genital area and the clitoris.

To the female genital area (*vulva*), *pubdendum femininum* (*vulva*), include pubis, large and small labia, the vestibule of the vagina.

Pubis

Pubis, *mons pubis*, is a skin covered with hair with well developed subcutaneous fat, located in the region of the pubic symphysis and upper branches of the pubic bones and is delimited from the abdomen by the pubic furrow, *sulcus*

pubicus, from the hips by the hip grooves, *sulcus pelviofemoralis*. The hair covering from the pubic skin continues downwards on the large labia.

Large labia

Large labia, *labia majora pudendi*, are paired skin folds extending from the pubic symphysis back to the anterior border of the pelvic diaphragm.

In front and behind the large labia joints are joined by two adhesions: a wider one — anterior lip adhesion, *commissura labiorum anterior* and narrow — posterior lip adhesion, *commissura labiorum posterior*. The slit-shaped space between two large labia is called the sexual slit, *rima pudendi*.

The skin covering the large labia contains many sebaceous and sweat glands.

The subcutaneous layer consists of well-developed fatty tissue, inside of which there are venous plexuses and connective tissue bridges that fix the labia majora to the periosteum of the pubic bones. Bundles of round ligament are intertwined in the thickness of the front sections.

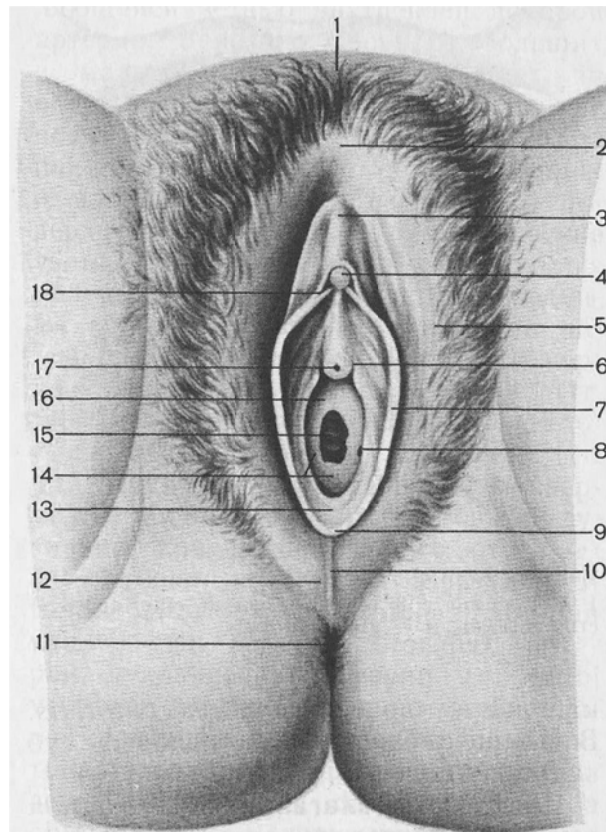


Figure 14 — External women's genitals:

- 1 — mons pubis; 2 — commissura labiorum anterior; 3 — preputium clitoridis;
4 — glans clitoridis; 5 — labium majus pudenda; 6 — ductus paraurethrales;
7 — labium minus pudendi; 8 — ductus glandulae vestibularis majoris;
9 — frenulum labiorum pudendi; 10 — commissura labiorum posterior; 11 — anus;
12 — perineum; 13 — fossa vestibuli vaginae; 14 — hymen; 15 — ostium vaginae;
16 — vestibulum vaginae; 17 — ostium urethrae externum; 18 — frenulum clitoridis

Small labia

Small labia, *labia minora pudendi*, are paired longitudinal thin skin folds without fatty tissue, but with a large number of elastic fibers and venous plexuses. Their lateral surface is attached to the *labia majora*, the medial — to the same surface of the *labia minora* of the opposite side, towards the entrance to the vagina.

The upper anterior end of each small labia is divided into two legs — lateral and medial, which are directed to the clitoris:

1. The lateral leg encircles the clitoris from above and from the front and, connecting with the same leg of the opposite side, forms the foreskin of the clitoris, *preputium clitoridis*.

2. The medial legs are joined at an acute angle and attached below the head of the clitoris, forming a frenulum of the clitoris, *frenulum clitoridis*.

The posterior ends of the *labia minora* are joined together by a small transverse fold, *frenulum labiorum pudendi*, which restricts from behind a small depression — the vestibule of the vestibule, *fossa vestibuli vaginae*.

The vestibule of the vagina

The vestibule, *vestibulum vaginae*, is a small indentation bordered from the front by the clitoris, from the rear by the fovea of the vestibule and the bridle of the *labia minora*, from the sides by the medial surfaces of the *labia minora*.

In the depth of the vestibule is the opening of the vagina, *ostium vaginae*. Between the clitoris in front and the vaginal opening behind, on the top of the papilla, is the external opening of the urethra, *ostium urethrae externum*, on each side of the mouth of the right and left paraurethral ducts, *ductus paraurethrales dexter et sinister*.

Also on the vestibule of the vagina open the ducts of large and small glands of the vestibule.

Large glands of the vestibule

Large glands of the vestibule (Bartholin glands), *glandulae vestibulares majores*, are paired, alveolar-tubular glands, the size of a pea (analogues of bulbourethral glands in men).

Located at the base of the *labia majora*, under the posterior end of the bulb of the vestibule. Isolate a mucus-like liquid of an alkaline reaction, moisturizing the walls of the entrance to the vagina.

The outlet duct opens in the vestibule of the vagina, on the inner surface of the *labia minora*, at the border of their middle and lower thirds.

Small glands of the vestibule

Small glands of the vestibule, *glandulae vestibulares minores*, are located in the thickness of the *labia minora*, on their medial surface, where their excretory ducts open.

Blood supply of the labia and glands of the vestibule:

Arteries:

— rr. labiales anteriores — branches a. pudenda externae from a. femoralis;

— rr. labiales posteriores — branch of a. perinealis from a. pudenda interna — branch of a. iliaca interna;

Glands of the vestibule — a. bulbi vestibuli from a. pudenda interna — branch of a. iliaca interna;

Veins: the outflow of venous blood occurs through the same veins vv. iliaci interni.

Innervation of the labia and glands of the vestibule:

1. Afferent innervation:

— nn. labiales anteriores — branches of n. ilioinguinalis et r. genitalis n. genitofemoralis of plexus lumbalis;

— nn. labiales posteriores — branches of n. pudendus from plexus sacralis;

The glands of the vestibule are from plexus pudendus.

2. Parasympathetic innervation — fibers nervi splanchnici pelvini from the nuclei parasympathici sacrales.

3. Sympathetic innervation comes from the plexus hypogastricus inferior along the arteries, blood supplying the external genitalia.

Lymph outflow occurs in nodi lymphatici inguinales superficiales.

Bulb of the vestibule

Bulb of the vestibule, bulbus vestibuli, is an analogue of the spongy body of the penis. It consists of a dense plexus of veins, surrounded by connective tissue and bundles of smooth muscle fibers encased in a squamous envelope.

The bulb of the vestibule in form resembles a horseshoe and consists of two parts — the right and left, which are connected by a thinned intermediate part of the bulb, *pars intermedia bulborum*, located between the external opening of the urethra and the clitoris.

The lateral parts of the bulb of the vestibule lie at the base of the labia majora, adjoining the posterior ends to the large glands of the vestibule.

Outside and below, the bulb of the vestibule is covered with bundles of bulbous-spongy muscle.

Clitoris

Clitoris corresponds to the cavernous bodies of the penis and consists of the head, body and legs.

1. The legs of the clitoris, crus clitoridis, are represented by the twin cavernous bodies of the clitoris, *corpora cavernosa clitoridis (dexter and sinister)*, which begin from the periosteum of the lower branches of the pubic bones.

2. The body of the clitoris, corpus clitoridis, is formed as a result of the connection of the legs of the clitoris at the lower edge of the pubic symphysis.

3. The head of the clitoris, *glans clitoridis*, — the front free end of the clitoris, lies in the upper part of the genital slit and is freely protruded between the ends of the labia minora. Above it is limited to the foreskin, *preputium clitoridis*, from below — the frenulum of the clitoris, *frenulum clitoridis*.

The cavernous bodies of the clitoris consist of a cavernous tissue with small cavities and are covered externally with an *albuginea tunica*.

The clitoris, with the exception of the head, is covered with a fibrous capsule — the fascia of the clitoris, *fascia clitoridis* and supported by a ligament that hangs the clitoris, *lig. suspensorium clitoridis*.

Blood supply of the clitoris and bulb of the vestibule:

Arteries:

— a. dorsalis clitoridis, a. profunda clitoridis, a. bulbi vestibule vaginae — branches a. pudenda interna from a. iliaca interna;

Veins: the outflow of venous blood occurs through the same veins, as well as in the plexus venosus vesicalis — in vv. iliaci interni.

Innervation:

1. Afferent innervation:

— n. dorsalis clitoridis — branch of n. pudendus from plexus sacralis.

2. Parasympathetic innervation — fibers nervi splanchnici pelvini from the nuclei parasympathici sacrales.

3. Sympathetic innervation is from the plexus hypogastricus inferior along the arteries, blood supplying the clitoris.

Lymph outflow occurs in nodi lymphatici inguinales superficiales et iliaci interni.

Female urethra

Female urethra, urethra feminina, is a 3–4 cm long tube that begins in the neck of the bladder with the inner opening of the urethra, *ostium urethrae internum* and ends with the outer opening of the urethra, *ostium urethrae externum*, on the vestibulum of the vagina between the clitoris (from above) and the opening of the vagina (from below).

Going down, the urethra curves around the bottom and behind the lower edge of the pubic symphysis and perforates the urogenital diaphragm, where it is surrounded by fibers of the striated muscle tissue, which form the external (arbitrary) sphincter of the urethra, *m. sphincter urethrae externum*.

In the female urethra, two walls are distinguished:

1. Front (anterior) — is located posteriorly from the pubic symphysis and is attached to the venous plexus of the bladder.

2. Back (posterior) — is fused with the anterior wall of the vagina.

The shells of the female urethra:

1. Mucosa, tunica mucosa, — has small indentations — lacunas (crypts) of the urethra, *lacunae urethrales* and longitudinal folds, *plicae longitudinales*, one of which is especially pronounced on the posterior wall of the urethra and has

the appearance of a crest of the urethra, *crista urethralis*. Also in the mucosa are the glands of the urethra, *glandulae urethrales*, which secrete the mucus of an alkaline reaction to moisturize the surface of the urethra.

2. The muscular membrane, *tunica muscularis*, is represented by the inner longitudinal and outer circular layers of muscles, *stratum longitudinale et stratum circulare*. In the area of the internal opening of the urethra, the circular layer fuses with the muscular membrane of the bladder and forms the internal (involuntary) sphincter of the urethra, *m. sphincter urethrae internum*.

3. The adventitia, *tunica adventitia*, consists of a thin layer of fibrous tissue.

Blood supply of the female urethra:

Arteries:

— rr. urethrales from a. vesicalis inferior, a. uterina and a. rectalis inferior (branches of a. iliaca interna);

— a. urethralis, a. perinealis branch from a. pudenda interna — branch of a. iliaca interna;

Veins: the outflow of venous blood occurs via the same veins mainly in the plexus venosus vesicalis et plexus venosus uterinus, as well as in v. pudenda interna, and then in v. iliaca interna.

Innervation:

1. Afferent innervation is provided by sensitive fibers of anterior branches of the lower sacral and coccygeal spinal nerves, as well as n. dorsalis clitoridis, a branch of n. pudendus of plexus sacralis.

2. Efferent innervation of the external sphincter of the urethra is provided by rr. perineales n. pudendus from plexus sacralis.

3. Parasympathetic innervation — fibers nervi splanchnici pelvini from the nuclei parasympathici sacrales.

4. Sympathetic innervation comes from the plexus hypogastricus inferior along the arteries that supply the urethra.

Lymph outflow occurs in nodi lymphatici inguinales superficiales et iliaci interni.

INTERNAL FEMALE GENITAL ORGANS

Ovaries

Ovary, ovarium (oöphoron — Greek) is a paired female sexual gland that serves to form and mature female reproductive cells (oocytes) and to produce female sex hormones (estrogens and progesterone).

The ovaries are located at the side wall of the pelvic cavity on both sides of the uterine fundus and are attached by means of a mesentery to the posterior leaf of the broad ligament of the uterus. Laterally, from above and partly medially the ovary is surrounded by the distal part of the fallopian tube.

In the ovary distinguished:

1. Surfaces:

- medial, facies medialis, — facing the uterus;
- lateral, facies lateralis, — is attached to the wall of the small pelvis.

2. Edges:

— a free (posterior) margin, margo liber, — convex, directed backwards and hangs into the cavity of the small pelvis;

— mesenteric (anterior), margo mesovaricus, — inverted and fused with the posterior leaf of the broad ligament of the uterus with the help of a mesentery. This edge has a depression — the gates of the ovary, hilum ovarii, through which the ovary enters the vessels and nerves.

3. The ends:

— the tubular (upper) end, extremitas tubarius, — faces the ovarian fimbria, fimbria ovarica, running from the funnel of the uterine tube;

— the uterine (lower) end, extremitas uterina, — is connected to the uterus via its own ovary ligament, lig.ovarii proprium.

Fixing (ligament) apparatus of the ovary:

1. A bunch that hangs the ovary, lig.suspensorium ovarii, is a fold of the peritoneum, which starts from the lateral wall of the small pelvis, goes downward and medially and is attached to the tubal end of the ovary. This ligament contains the vessels and nerves of the ovary.

2. The ligament of the ovary, lig.ovarii proprium, passes in the thickness of the broad ligament of the uterus and connects the uterine end of the ovary to the bottom of the uterus, attaching to it below the place of entry of the fallopian tube.

3. Mesentery of the ovary, mesovarium, — the duplication of the peritoneum, which comes from the posterior leaf of the broad ligament of the uterus to the mesenteric margin of the ovary.

The ovaries themselves are not covered by the peritoneum!

Structure of the ovary

Ovary on the outside is covered with a single-layered germinal epithelium (peritoneal mesothelium), beneath which is a dense squamous ovary, tunica albuginea.

The stroma of the ovary, stroma ovarii, consists of a connective tissue with a large number of elastic fibers, vessels and nerves.

Parenchyma of the ovary consists of two layers:

1. External, cortex ovarii, is located on the periphery and consists of a connective tissue with follicles of varying degrees of maturity.

2. The medulla ovarii is the inner layer located in the center of the ovary, closer to its gates. It contains numerous blood and lymphatic vessels, nerves.

Ovarian cycle

Ovarian cycle — cyclic changes in the ovary (growth and maturation of the ovum, ovulation, formation of the yellow body). The average duration is 28 days.

Phases of the ovarian cycle:

1. *The follicular phase* (1–14 days) — under the influence of follicle-stimulating hormone of the pituitary gland, in which the growth and maturation of the follicle (containing the egg) occurs.

2. *The phase of ovulation* — the process of rupturing the mature follicle (Graaf's vesicle), accompanied by the release of the oocyte with the follicular fluid into the peritoneal cavity, and then through the uterine tube into the uterine cavity. Ovulation occurs at the peak of the secretion of follicle-stimulating and luteinizing hormones in the pituitary gland.

3. *The phase of development of the yellow body (luteal)* — occupies the second half of the menstrual cycle when a yellow body forms on the site of the burst follicle, corpus luteum, the development and functioning of which occurs under the action of the luteinizing hormone of the pituitary and prolactin. Cells of the yellow body produce the hormone progesterone.

If the egg is fertilized, the yellow body of pregnancy, corpus luteum graviditatis, which functions the first 12–14 weeks of pregnancy, is formed, providing the development of progesterone until the formation of the placenta.

Under the action of progesterone occurs:

— preparation of the endometrium for implantation and embryo development;

— lowering the excitability and contractile activity of the uterus, thereby contributing to the preservation of pregnancy;

— stimulation of development of the parenchyma of the mammary glands and their preparation for the secretion of milk;

— inhibition of the production of the luteinizing hormone of the pituitary gland, which retards the development of follicles in the ovaries.

If the fertilization of the egg does not occur, then the yellow body is called the menstrual yellow body, corpus luteum ciclicum (menstruationis) and at the end of the luteal phase its reverse development and replacement by connective tissue occurs. Thus, an off-white body is formed, corpus albicans.

In places of the bursted follicles on the surface of the ovary, scars remain in the form of depressions and folds, the number of which increases with age.

Ovarian appendages

1. Ovarian appendages, epoöphoron, is located in the lateral part of the mesentery of the fallopian tube, mesosalpinx, behind the ovary.

It consists of a network of thin convoluted transverse grooves, ductuli transversi, which run from the ovary gates to the fallopian tube, and drain into the longitudinal duct of the ovary aditum, ductus epoöphorontis longitudinalis.

2. The paroöphoron, paroöphoron, is also located in the mesentery of the uterine tube, medially from the ovarian appendage. Consists of several disconnected, blind canals.

3. Vesicular pendants, appendices vesiculosae, — bubbles with clear liquid, suspended on long legs.

Located lateral to the ovaries, under the funnel of the uterine tube.

Blood supply to the ovary:

Arteries:

— a. ovarica of pars abdominalis aortae descendens;

— rr. ovarici a. uterina from a. iliaca interna.

Veins: the outflow of venous blood occurs through the same veins mainly in the plexus venosus uterinus, and also in v. ovarica — in the v. cava inferior (right) and v. renalis (left).

Innervation: along the body, nerve fibers form the ovarian plexus, plexus ovaricus:

1. Afferent innervation is provided by sensitive fibers passing through the plexus aorticus abdominalis to the upper lumbar spinal nodes.

2. Parasympathetic innervation — fibers nervi splanchnici pelvini from the nuclei parasympathici sacrales.

3. Sympathetic innervation comes from plexus aorticus abdominalis along the arteries that supply the ovaries.

Lymph outflow occurs in the nodi lymphatici lumbales.

The uterine tube

Uterine (Fallopian) tube, tuba uterina (salpinx — Greek.) — paired hollow organ, which serves to carry the egg from the peritoneal cavity into the uterine cavity. The length of the uterine tube is about 10–12 cm.

Fallopian tubes are located in the cavity of the small pelvis, in the upper part of the wide ligament of the uterus.

Departments of the fallopian tube:

1. The uterine (intrastinal, intramural) part, pars uterina (intramuralis), is enclosed in the thickness of the uterine wall.

2. The isthmus of the fallopian tube, isthmus tubae uterinae, is the narrowest, shortest and thickest part. Approaches the corner of the uterus on the border between her bottom and body.

3. The ampulla of the fallopian tube, ampulla tubae uterinae, is the longest part (up to 8 cm).

4. Funnel of the fallopian tube, infundibulum tubae uterinae, — an enlarged part of the ampoule, which ends with numerous processes — the fimbriae of the tube, fimbriae tubae.

The longest of these is the ovarian fimbria, fimbria ovarica, which reaches the tube end of the ovary and attaches to it. Fimbriae direct the egg toward the funnel of the uterine tube.

Holes of the fallopian tube:

1. The ventral orifice of the uterine tube, ostium abdominale tubae uterinae, is located on the bottom of the funnel of the uterine tube, through which the uterine tube communicates with the abdominal cavity.

2. The uterine orifice of the uterine tube, ostium uterinum tubae uterinae, is located in the intra-wall part and opens into the uterine cavity.

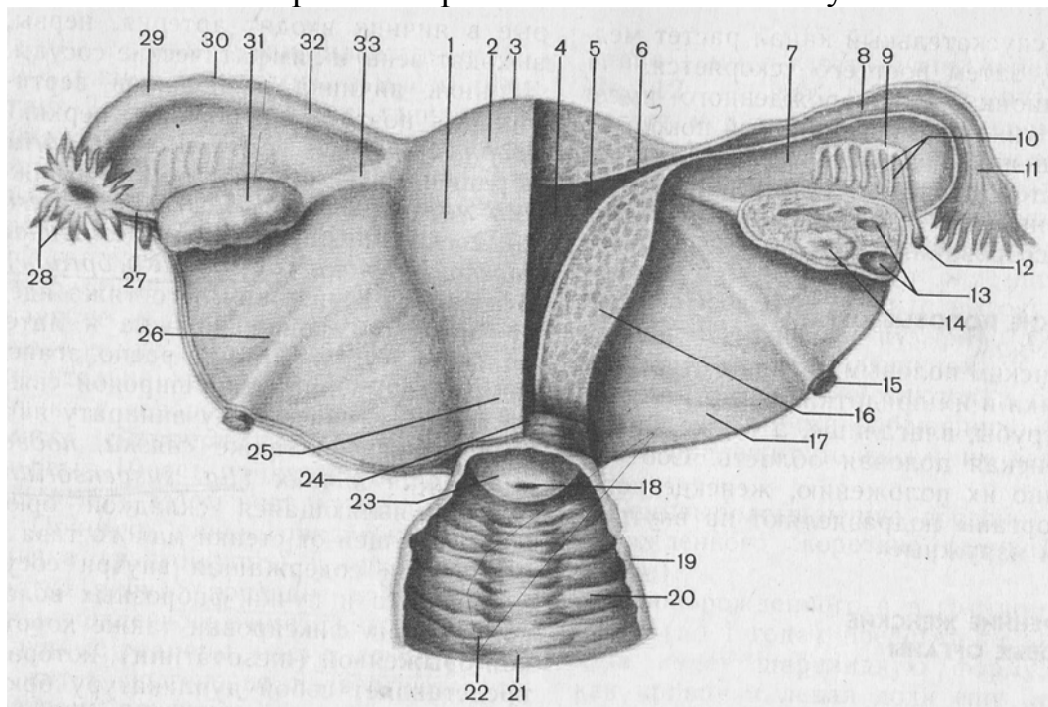


Figure 15 — Internal women's genitals; rear view:

- 1 — corpus uteri; 2 — tun. serosa [perimetrium]; 3 — fundus uteri; 4 — cavitas uteri;
- 5 — tun. mucosa [endometrium]; 6 — ostium uterinum tubae; 7 — mesosalpinx;
- 8 — plicae tubariae; 9 — ductus epoophori longitudinalis; 10 — ductuli transversi;
- 11 — infundibulum tubae uterinae; 12 — appendix vesiculosa;
- 13 — folliculi ovarici vesiculosi; 14 — corpus luteum; 15 — lig. teres uteri;
- 16 — tun. muscularis [myometrium]; 17 — lig. latum uteri (back sheet deleted);
- 18 — ostium uteri; 19 — tun. muscularis vaginae; 20 — tun. mucosa vaginae;
- 21 — columna rugarum anterior; 22 — rugae vaginales; 23 — portio vaginalis uteri;
- 24 — canalis cervicis uteri; 25 — cervix uteri (portio supravaginalis);
- 26 — lig. latum uteri (back sheet); 27 — fimbria ovarica; 28 — fimbriae tubae;
- 29 — ampulla tubae uterinae; 30 — tuba uterina; 31 — ovarium;
- 32 — isthmus tubae uterinae; 33 — lig. ovarii proprium

Uterine tube shells:

1. The mucosa, tunica mucosa, is represented by a single-layered cylindrical and ciliate epithelium. Cilia flicker toward the uterine cavity, which promotes the movement of the egg. Throughout the oviduct, the mucosa forms longitudinal tubular folds, plicae tubariae, which are best expressed in the region of the ampullar region.

2. The muscular membrane, tunica muscularis, is the thickest and is represented by two layers: external — longitudinal and internal — circular. The thickness of the muscle layer increases towards the uterus, which is the determining factor in the peristalsis of the tube and the progress of the egg along it.

3. Serous membrane, tunica serosa — visceral peritoneum, covering the fallopian tube from all directions and passing down into the mesentery of the fallopian tube, mesosalpinx, which is part of the broad ligament of the uterus.

Blood supply to the uterine tube:

Arteries:

— rr. tubarii a. uterina et a. ovarica — branches of a. iliaca interna et pars abdominalis aortae descendens.

Veins: the outflow of venous blood occurs through the same veins mainly in the plexus venosus uterinus, and then in v. iliaca interna.

Innervation: along the body, the nerve fibers form a plexus plexus, plexus tubarius:

1. Afferent innervation is provided by sensitive fibers of the sacral spinal nerves.

2. Parasympathetic innervation — fibers nervi splanchnici pelvini from the nuclei parasympathici sacrales.

3. Sympathetic innervation comes from the plexus hypogastricus inferior along the arteries, blood supplying the uterine tube.

Lymph outflow occurs in the nodi lymphatici lumbales.

The uterus

Uterus (metra — Greek.) — unpaired hollow muscular organ, intended for menstrual function, implantation of a fertilized egg, fetation and delivery.

The uterus is located in the cavity of the small pelvis between the bladder in front and the rectum — behind, on top of it are the intestinal loops, and on the sides — the appendages of the uterus (ovary with appendages and fallopian tubes).

The uterus is pear-shaped and flattened in anteroposterior direction.

Parts of the uterus:

1. The uterine fundus, fundus uteri, is the upper part of the uterus, which rises in the form of a vault above the openings of the fallopian tubes.

2. The uterus body, corpus uteri, has a conical shape and is the largest part of the organ.

3. The isthmus of the uterus, *isthmus uteri*, is the narrowed part located between the body and the cervix.

4. The cervix of the uterus, *cervix uteri*, is the lower part of the organ.

In the neck, two parts are distinguished:

— the supra-vaginal part, *portio supravaginalis cervicis*, is located above the vagina and is the upper two-thirds;

— the vaginal part, *portio vaginalis cervicis*, is the lower third of the cervix, which extends into the vaginal cavity and has a hole in the uterus, *ostium uteri* (uterus), which is confined to the anterior and posterior *labium anterius* and *labium posterius*. The posterior lip is somewhat longer and thinner than the anterior one.

In nulliparous women, the uterine orifice is round or oval, and in those who give birth, it has the shape of a transverse slit.

The opening of the uterus leads to the cervical canal, *canalis cervicis uteri*, and then into the cavity of the uterus. The uterine cavity has a triangular shape on the frontal incision, the base of which is directed towards the bottom of the uterus, and the apex — downward, towards the cervix.

In the upper corners of the triangle open the orifices of the fallopian tubes, and in the lower corners — the inner opening of the uterine throat leading to the cervical canal.

The uterus has two surfaces and two edges.

Surfaces of the uterus:

1. Bubble (front) surface, *facies vesicalis* (anterior) — faces the bladder.
2. Intestinal (posterior) surface, *facies intestinalis* (posterior) — faces the rectum.

Uterine margins: right and left, *margo dexter et margo sinister*, separate the surfaces of the uterus from each other.

Shells of the uterus:

1. The mucosa, *tunica mucosa* (*endometrium*), lining the uterine cavity from the inside, is covered with a single-layer prismatic epithelium and contains simple tubular uterine glands, *glandulae uterinae*, which in the neck region are called cervical glands, *glandulae cervicales*.

The mucous membrane of the uterine cavity is smooth, with the exception of the cervical canal, in which there are one longitudinal crease on the anterior and posterior walls, *plicae longitudinales*, from which the smaller, palmoid folds, *plicae palmatae*, extend at an acute angle. These folds touch each other and prevent the penetration of the contents of the vagina into the uterine cavity.

2. The muscular membrane, *tunica muscularis* (*myometrium*) is the thickest layer of the uterine wall. It consists of three layers of intertwined smooth muscle fibers with an admixture of loose fibrous connective tissue.

1) The outer oblique layer, *stratum longitudinale*, is thin, densely fused with the serous cover.

2) The middle circular layer, *stratum circulare*, is the most powerful, most strongly developed in the cervical region. It contains a large number of blood and lymph vessels (especially large veins).

3) The inner oblique layer, *stratum longitudinale*, is the thinnest, located under the mucous membrane.

3. The subserous base, *tela subserosa (parametrium)*, is a loose otomatous cellulose, transient in the cervical region into parietal cellulose (*paracervix*). The subserous base is present only in the neck region and along the edges of the uterus body, where the peritoneum covering the uterus passes into the right and left broad ligament of the uterus.

In the periarticular tissue, the ureter passes, the uterine artery and the utero-vaginal neural plexus.

4. The serous membrane, *tunica serosa (perimetrium)*, is represented by the visceral leaf of the peritoneum, which covers the uterus from all sides (intraperitoneally), with the exception of the vaginal part of the cervix.

The peritoneum of the vesicle surface of the uterus goes to the supravaginal part of the cervix, then passes to the posterior surface of the bladder, forming a vesicouteral cavity, *excavatio vesicouterina*.

The peritoneum covering the intestinal surface of the uterus reaches the posterior wall of the vagina, then, rising upwards, it passes to the front wall of the rectum, forming a deep pocket between the rectum and the uterus, the rectum-uterine cavity, the *excavatio rectouterina (Douglas space)*.

On the right and on the left, this indentation is limited to rectal-uterine folds of the peritoneum, in which the rectal-uterine and sacro-uterine ligaments with bunches of rectum-uterine muscle lie. They extend from the cervix to the lateral surfaces of the rectum and to the pelvic surface of the sacrum.

In clinical practice, Douglas space plays an important diagnostic role, since it can accumulate various fluids (pus, blood, serous effusion) in pathological processes of the peritoneal and pelvic organs.

Ligaments of the uterus:

1. A wide ligament of the uterus, *lig. latum uteri*, consists of two sheets of the peritoneum, anterior and posterior, and is located between the margins of the uterus and the lateral walls of the small pelvis, where it passes into the parietal peritoneum. Its lower part serves as a mesentery of the uterus, a *mesometrium*, as between its leaves there are vessels and nerves, surrounded by a connective tissue.

In the free upper edge of the broad ligament of the uterus, between the leaves of the uterus, the uterine tube is located.

The posterior leaf of the broad ligament of the uterus is attached to the mesenteric margin of the ovary and is called the mesentery of the ovary, *mesovarium*. The site of the broad ligament of the uterus, located between the mesentery of the ovary and the fallopian tube is called the mesentery of the uterine tube, *mesosalpinx*, in which the ovary fimbria and ovaries are located.

Also between the leaves of the broad ligament of the uterus pass their own ligament of the ovary and a round ligament of the uterus.

2. Round ligament of the uterus, lig. teres uteri, — a round dense cord that extends from the lateral edge of the uterus, below the fallopian tube, is directed forward and downward, passes through the inguinal canal and is woven into the cellulose of the pubis and large labia.

3. Cardinal ligaments of the uterus, ligg. cardinalia uteri, — tensioned between the cervix and lateral walls of the pelvis. Keep the uterus from lateral displacements.

The position of the uterus: in normal (with a bladder emptied) the uterus is tilted anteriorly — anteversio uteri, the bottom is directed to the vertex.

Leaning forward, the uterus body forms with the neck an angle open anteriorly, — the bend of the uterus in front - anteflexio uteri.

Blood supply of the uterus:

Arteries:

— a. uterina et a. ovarica — branches of a. iliaca interna et pars abdominalis aortae descendens.

Veins: the outflow of venous blood occurs through the same veins mainly in the plexus venosus uterinus, and then in v. iliaca interna.

Innervation: along the body, the nerve fibers form the uterine plexus, plexus uterinus (part of the uterine-vaginal plexus):

1. Afferent innervation is provided by sensitive fibers of the sacral spinal nerves.

2. Parasympathetic innervation — fibers nervi splanchnici pelvini from the nuclei parasympathici sacrales.

3. Sympathetic innervation comes from the plexus hypogastricus inferior along the arteries, blood supplying the uterus.

Lymph outflow occurs in nodi lymphatici lumbales, iliaci interni, sacrales, inguinales profundi et superficiales.

The vagina

Vagina (colpos — Greek.) — unpaired hollow organ, shaped like a tube, flattened in anteroposterior direction and connecting the uterus to the external genital organs.

The vagina is located in the cavity of the small pelvis and borders:

— front and top with the bottom of the bladder, and from below — tightly fused to the posterior wall of the urethra;

— back — with the front wall of the rectum;

— laterally from the vagina there is a powerful venous plexus of the vagina and the pelvic part of the ureter;

— below the vagina passes through the urogenital diaphragm, connecting in this place with the pubic bone with an unpaired transverse crotch of the perineum. This part is the least mobile.

The vagina has a front wall, paries anterior, and a posterior wall, paries posterior, which is longer than the anterior wall by 1.5–2 cm.

At the top of the vaginal cavity, the vaginal part of the cervix extends, the slit-like space that forms between them is called the vagina vault, fornix vaginae.

In the vaginal vault, four parts are distinguished:

- front part, pars anterior;
- back, pars posterior;
- two lateral parts, partes laterales.

The posterior part of the arch is deeper, since the posterior wall of the vagina is longer than the anterior one. At this point, the wall of the vagina is covered with a peritoneum lining the rectum-uterine cavity, excavatio rectouterina. In relation to the peritoneum, the organ lies extraperitoneally.

Below the vagina narrows, and opens on the threshold of the vagina with a vaginal opening, ostium vaginae. In girls it is covered with hymen (connective tissue membrane, covered with mucous membrane), which separates the vagina from its vestibule. After its rupture, there are fragments of the hymen, carunculae hymenales.

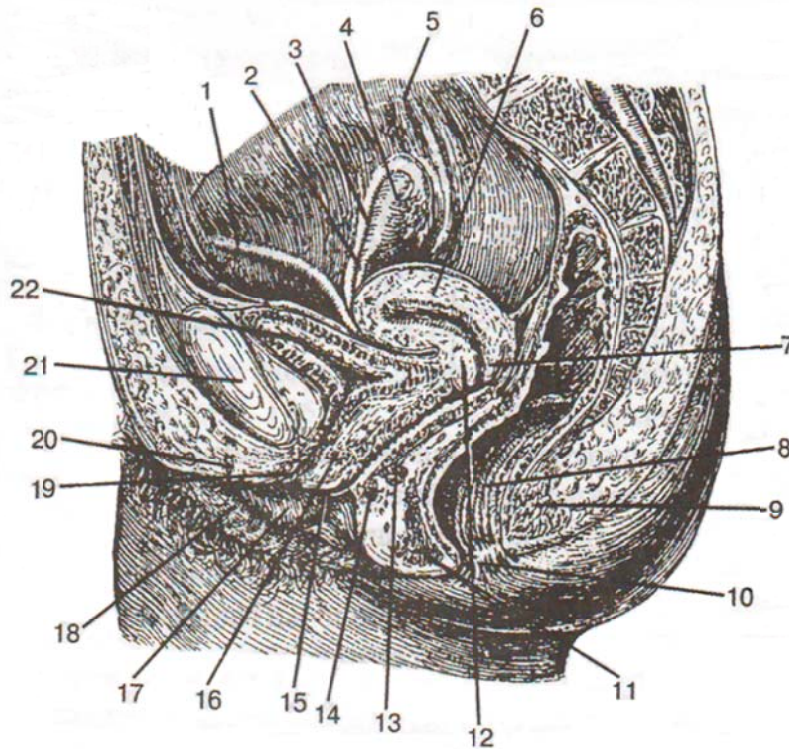


Figure 16 — Middle sagittal sectional view of the woman's pelvis:

- 1 — lig. teres uteri; 2 — lig. ovarii proprium; 3 — tuba uterina; 4 — ovarium; 5 — ureter;
 6 — uterus; 7 — labium posterius uteri; 8 — rectum; 9, 11 — m. sphincter ani externus;
 10 — anus; 12 — labium anterius uteri; 13, 14, 16 — m. of the urogenital diaphragm;
 15 — enter in the vagina; 17 — labium minus pudendi; 18 — labium majus pudendi;
 19 — urethra; 20 — clitoris; 21 — symphysis pubica; 22 — vesica urinaria

The wall of the vagina consists of three membranes:

1. Mucous membrane, tunica mucosa is covered with multilayered flat epithelium, glands does not contain.

It forms numerous transverse vaginal folds (wrinkles), *rugae vaginales*. On the anterior and posterior walls of the vagina, closer to the median line, the folds become higher and form longitudinally oriented ridges — columns of folds, *columnae rugarum*. The front and posterior columns of the folds, *columna rugarum anterior* and *posterior*, are located on opposite sides of the median plane and do not overlap.

The anterior column of the folds is better expressed, at the bottom it forms a longitudinally oriented projection of the mucosa — the urethral carina of the vagina, *carina urethralis vaginae*, which corresponds to the urethra channel adjacent to the anterior vaginal wall.

2. The muscular membrane, *tunica muscularis*, consists of smooth muscle tissue, which at the top passes into the musculature of the uterus, and below it becomes more powerful and its beams interweave in the muscles of the perineum.

The muscular membrane consists of two layers:

— inner, circular layer, *stratum circulare*;

— outer, longitudinal layer, *stratum longitudinale* — more powerful.

3. *Adventitia, tunica adventitia*, — the outer shell.

Blood supply of the vagina:

Arteries:

— *aa. uterina, vesicalis inferior, rectalis media et pudenda interna* — branches of *a. iliaca interna*.

Veins: the outflow of venous blood occurs through the same veins mainly in the *plexus venosus vaginalis, vesicalis, uterinus et rectalis*, and then in *v. iliaca interna*.

Innervation: along the body, nerve fibers form the vaginal plexus, *plexus vaginalis* (part of the *utero-vaginal plexus*):

1. Afferent innervation is provided by sensitive fibers of the sacral spinal nerves.

2. Parasympathetic innervation — fibers *nervi splanchnici pelvini* from the *nuclei parasympathici sacrales*.

3. Sympathetic innervation comes from the *plexus hypogastricus inferior* along the arteries, blood supplying the vagina.

Lymph outflow occurs in *nodi lymphatici, iliaci interni, sacrales, inguinales profundi et superficiales*.

The Perineum

The perineum is understood in a broad and narrow sense.

The perineum in the *broad sense* is a complex of soft tissues (muscles, fascia, skin) that close the exit from the cavity of the small pelvis (*apertura inferior pelvis minoris*). A complex of soft tissues closing the exit from the small pelvis in the clinic is called the pelvic floor.

The perineum in the *narrow sense* is part of the perineum between the posterior edge of the vulva and the anterior edge of the anal opening.

Perineum restricts:

- in front — the lower edge of the pubic symphysis;
- behind — the tip of the coccyx;
- from the sides — the lower branches of the pubic bones, branches of the ischium bones, sacro-tuberale ligaments and sciatic tuber.

The intersiding line, *linea biischiastica*, which connects the ischial hillocks with each other, divides the perineum into two areas:

- the anterior, smaller, urogenital region (in men in this area is the root of the penis, in women — the external genitalia);
- an anterior, large, anal region (in this area there is an anus).

Seam of the perineum, *raphe perinei*, runs along the median line of the perineum (in men it continues into the *scrotum seam*).

Soft perineal tissues include the skin, subcutaneous fatty tissue, muscle, fascia, peritoneum with preperitoneal adipose tissue and connective tissue.

Through the urogenital diaphragm in men passes the urethra, in women — the urethra and the vagina. Through the diaphragm of the pelvis both in men and in women there is a terminal department of the rectum.

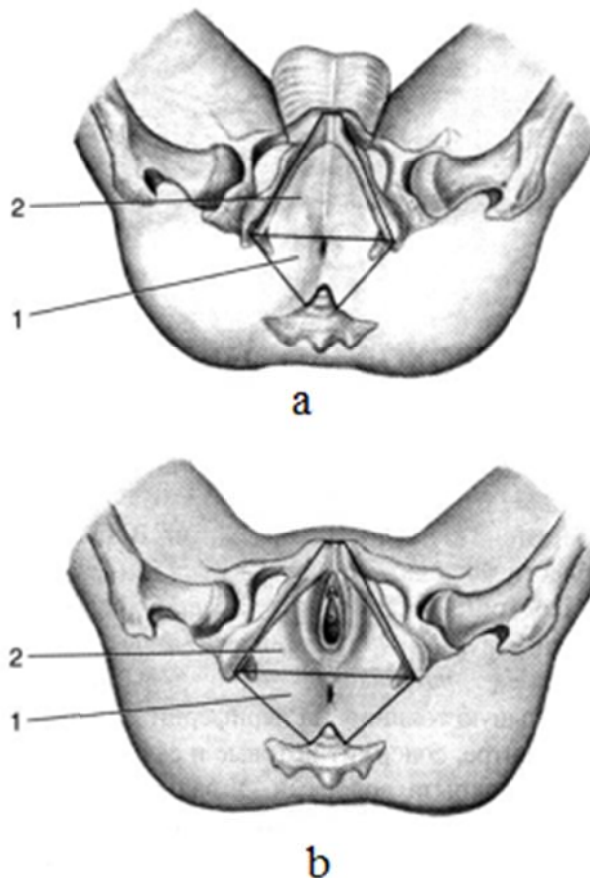


Figure 17 — Boundaries male (a) and female (b) crotch:
1 — pelvic regio; 2 — urogenital regio

Muscles of urogenital diaphragm

Superficial muscles of the genitourinary diaphragm (muscles of the external genital organs):

1. Surface transverse perineum muscle (m. transversus perinei superficialis), paired:

- the beginning — the branch of the ischium;
- the end is the tendon center of the perineum;
- function — strengthening of the tendinous center of the perineum.

2. The ischioconstrictor muscle (m. ischiocavernosus), paired:

— the beginning — the branch of the ischium;
— the end — the fibers are woven into the belly shell of the cavernous body of the penis (in men) or the clitoris (in women);

— function — presses the superficial veins of the penis (clitoris), which causes stagnation of venous blood in the cavernous bodies and thereby promotes erection in men. In women, its effect is negligible.

3) Bulb-spongy muscle (m. bulbospongiosus) consists of two symmetrical halves (in men) and a pair (in women):

— the beginning — tendon center of the perineum and seam on the lower surface of the bulb of the penis (in men);

— the end — the fibers are attached to the white shell of the spongy sexual body in men or the belly clitoral membrane in women;

— function — in men it compresses the cavernous and spongy bodies of the penis, deep dorsal vein of the penis, bulbourethral glands. Narrows and shortens the urethra, accelerating the movement of urine. He takes part in an erection: at the moment of orgasm he throws out the seed from the urethra. Women have narrowed the entrance to the vagina, bulb of the vestibule and a large gland of the vestibule.

Deep muscles of the urogenital diaphragm:

1. Deep transverse muscle of the perineum (m. transversus perinei profundus), paired:

- the beginning — branch of the sciatic and pubic bones;
- the end — connects to the same-named muscle of the opposite side;
- function — strengthening the urogenital diaphragm.

2. Urethral sphincter (m. sphincter urethrae):

— location — the lower branch of the pubic bone, bundles of fibers (have a circular view) cover the men in the membranous part of the urethra, in women — the urethra;

— function — compression of the urethra, as well as bulbourethral glands in men and large glands of the vestibule in women.

Muscles of the diaphragm of the pelvis

Superficial muscles of the pelvic diaphragm:

1. External sphincter of anus (m. sphincter ani externus), unpaired:

— location — a bundle of fibers surrounds the anus and the adjacent portion of the rectum;

— function — when contracting, compresses the anus from the sides, forming a longitudinal slit (muscle contraction depends on our will).

Deep muscles of the pelvic diaphragm:

1. The muscle lifting the anus (m. levator ani), the paired one forms the posterior part of the bottom of the pelvic cavity:

— the beginning — bundles of fibers from the side wall of the small pelvis and the tendon arch of the muscle lifting the posterior;

— the end — the muscle bundles are directed downwards and backwards, joining one another, covering the rectum and terminating at the tip of the coccyx in the form of the anal-coccygeal ligament (lig. anococcygeum);

— function — compressor: strengthens and raises the pelvic floor. Pulls forward and upward the end section of the rectum.

2. Coccygeal muscle (m. coccygeus), paired:

— the beginning — sciatic forearm and sacro-awned ligament;

— the end is the lateral margin of the coccyx, the tip of the sacrum;

— function — strengthening the diaphragm of the pelvis.

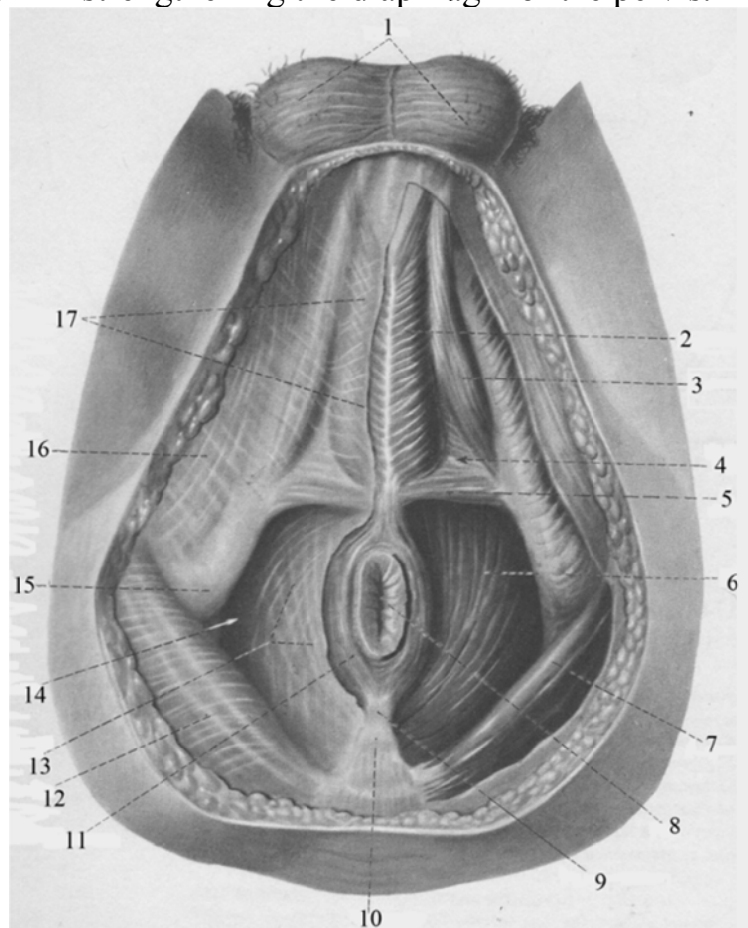


Figure 18 — Muscles and fascia male crotch:

- 1 — scrotum; 2 — m. bulbospongiosus; 3 — m. ischiocavernosus; 4 — diaphragma urogenitale;
5 — m. transversus perinei superficialis; 6 — m. levator ani; 7 — m. gluteus maximus; 8 — anus;
9 — lig. anococcygeum; 10 — os coccygis; 11 — m. sphincter ani externus; 12 — fascia glutea;
13 — fascia diaphragmatis pelvis inferior; 14 — fossa ischiorectalis; 15 — tuber ischiadicum;
16 — fascia lata; 17 — fascia superficialis perinei

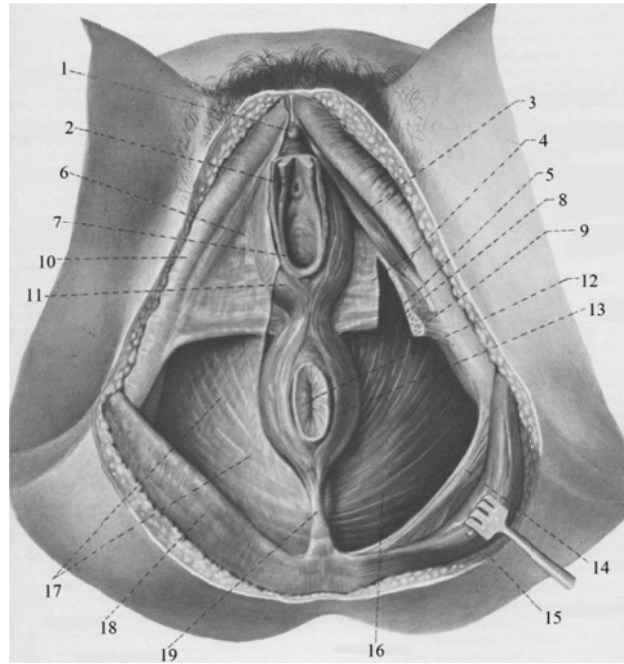


Figure 19 — Muscles and fascia female crotch:

- 1 — glans clitoridis; 2 — ostium urethra externum; 3 — m. ischiocavernosus;
 4 — fascia diaphragmatis urogenitalis inferior; 5 — m. transversus perinei profundus;
 6 — fascia superficialis perinei; 7 — ostium vaginae; 8 — fascia diaphragmatis urogenitalis superior;
 9 — m. transversus perinei superficialis; 10 — fascia lata; 11 — m. bulbospongiosus; 12 — anus;
 13 — m. sphincter ani externus; 14 — lig. sacrotuberale; 15 — m. gluteus maximus; 16 — m. levator ani;
 17 — fascia diaphragmatis pelvis inferior; 18 — fascia glutea; 19 — lig. anococcygeum

Fascia of the perineum

1. The superficial (subcutaneous) fascia of the perineum (fascia perinei superficialis) — is a continuation of the superficial fascia of nearby areas. It covers the superficial perineal muscles from the outside.

2. The lower fascia of the pelvic diaphragm (fascia diaphragmatis pelvis inferior) is located between the superficial and deep muscles of the urogenital diaphragm. It is a continuation of its own fascia of the gluteus maximus. It covers the following muscles: lifting the anus, the external sphincter of the anus, the occlusal muscle. Also lining the sciatic-rectum fossa.

There are three plates of the lower fascia of the pelvic diaphragm:

A) the superficial plate of the lower fascia of the pelvic diaphragm (lamina superficialis fasciae diaphragmatis pelvis inferior) — covers the bulbous-spongy muscle, the ischial-cavernous muscle and the superficial transverse muscle of the perineum;

B) the lower fascia of the genitourinary diaphragm (fascia diaphragmatis urogenitalis inferior) — covers the deep transverse muscle of the perineum and the external sphincter of the urethra;

C) the upper fascia of the genitourinary diaphragm (fascia diaphragmatis urogenitalis superior) — covers the deep transverse muscle of the perineum and the external sphincter of the urethra.

3. The superior fascia of the pelvic diaphragm (fascia diaphragmatis pelvis superior) — is part of the intra-abdominal fascia and covers the muscle that raises the anus.

THE ISCHIO-ANAL FOSSA

The ischial-rectal (anal) fossa, fossa ischiorectalis (ischioanalis) is a paired depression in the perineal region, located on either side of the terminal section of the rectum and ischial tuber, filled with fatty tissue, vessels, nerves and lymph nodes.

Limits of the ischiorectalis fossa:

- front — superficial and deep transverse muscles of the perineum;
- posterior — posterior bundles of the coccygeal muscle and muscle lifting the anus;
- medial — external sphincter of the anus and muscle lifting the anus (its outer surface);
- lateral — medial surface of the ischial tuberosus and internal occlusal muscle.

In the sciatic and rectum fossa is the fatty tissue called fatty body (*corpus adiposum fossae ischiorectalis*), the vessels of the internal sexual artery and veins, the branches of the genital nerve, as well as small lymph vessels and nodes.

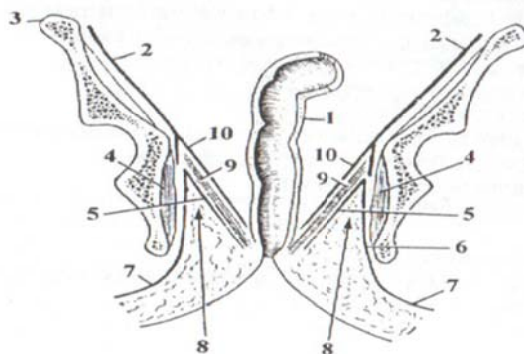


Figure 20 — Fascia of the perineum. Fossa ischiorectalis:

- 1 — rectum; 2 — f. pelvis; 3 — ileum; 4 — m. obturatorius internus;
5 — fascia diaphragmatic pelvis inferior; 6 — fascia obturatoria; 7 — fascia glutea;
8 — fossa ischiorectalis; 9 — m. levator ani; 10 — fascia diaphragmatis pelvis superior

Blood supply to the perineum

Arteries:

- rr. perineales, scrotales (labiales) posteriores, musculares and rectalis inferioris from a. pudenda interna from a. iliaca interna;
- rr. scrotales (labiales) anteriores — branches aa. pudendae externae from a. femoralis.

Veins:

- flow of blood occurs through the same veins in v. iliaca interna and v. femoralis.

Innervation of the perineum.

- afferent, efferent and sympathetic innervation — fibers n. pudendus from plexus sacralis;

Lymphatic vessels: outflow of lymph occurs mainly in nodi lymphatici inguinales superficiales.

TESTS

Choose one correct answer

1. Kidney gate is everything except:

Variants of answer:

- a) the ureter;
- b) renal artery;
- c) renal vena;
- d) renal pelvis;
- e) lymphatics.

2. Does not apply to the fixing apparatus of the kidney:

Variants of answer:

- a) renal bed;
- b) the ureter;
- c) intra-abdominal pressure;
- d) renal pedicle;
- e) kidney membranes.

3. It is not coated kidney:

Variants of answer:

- a) capsula adipose;
- b) capsula fibrosa;
- c) fascia renalis;
- d) capsula muscularis;
- e) there is no right answer.

4. Which of the muscle does not apply to fornical kidney machine?

Variants of answer:

- a) m. levator fornicis;
- b) m. depressor fornicis;
- c) m. sphincter fornicis;
- d) m. longitudinalis calicis;
- e) m. spiralis calicis.

5. How many small cups of kidney in one kidney?

Variants of answer:

- a) 2–3;
- b) 4–5;
- c) 6–7;
- d) 8–9;
- e) 10–11.

6. What is the average papillae renales in each kidney?

Variants of answer:

- a) 10;
- b) 11;
- c) 12;
- d) 13;
- e) 14.

7. What is the structural and functional unit of the kidney?

Variants of answer:

- a) nephron;
- b) acinus;
- c) lobuli;
- d) segment;
- e) sector.

8. What is the lobulus corticalis?

Variants of answer:

- a) pars radiata et pars convolute;
- b) pars radiata et pyramides renales;
- c) pars convoluta et pyramides renales;
- d) pars radiata et columnae renales;
- e) pars convoluta et columnae renales.

9. Department of the nephron is not:

Variants of answer:

- a) glomerular capsule;
- b) a capillary glomerulus;
- c) collecting ducts;
- d) a proximal twisted tubule;
- e) a distal twisted tubule.

10. In what department of the nephron is the process of filtering the primary urine?

Variants of answer:

- a) corpusculum renis;
- b) tubulus renalis contortus;
- c) tubulus renalis rectus;
- d) ductus papillares;
- e) there is not right answer.

11. Length ureter:

Variants of answer:

- a) 10 cm;

- b) 15 cm;
- c) 20 cm;
- d) 25 cm;
- e) 30 cm.

12. The bladder is not isolated:

Variants of answer:

- a) apex;
- b) cervix;
- c) corpus;
- d) fundus;
- e) base.

13. Name the muscles of the bladder:

Variants of answer:

- a) m. detrusor urinae;
- b) m. sphincter vesicae;
- c) m. levator apex vesicae;
- d) a + b;
- e) a + c.

14. Sperm cells are formed:

Variants of answer:

- a) direct the seminiferous tubules;
- b) the convoluted seminiferous tubules;
- c) efferent tubules;
- d) tubules of the rete testis;
- e) a tributary of the epididymis.

15. Not applicable to internal male sex organs:

Variants of answer:

- a) testis;
- b) prostate;
- c) epididymis;
- d) uterus;
- e) ductus deferens.

16. The number of slices egg comes to:

Variants of answer:

- a) 150–200;
- b) 200–250;
- c) 250–300;
- d) 300–350;
- e) 350–400.

17. Which of the testis shells is considered to be the innermost?

Variants of answer:

- a) tunica vaginalis testis;
- b) fascia spermatica externa;
- c) fascia spermatica interna;
- d) fascia cremasterica;
- e) tunica dartos.

18. The length of the ductus deferens is:

Variants of answer:

- a) 25–30 cm;
- b) 30–35 cm;
- c) 35–40 cm;
- d) 40–45 cm;
- e) 45–50 cm.

19. The penis is not isolated:

Variants of answer:

- a) cavernosum body;
- b) spongy body;
- c) a head;
- d) a neck;
- e) sex gap.

20. The amount of the corpus cavernosum of the penis is:

Variants of answer:

- a) 1;
- b) 2;
- c) 3;
- d) 4;
- e) 5.

21. Where opens the external opening of the urethra of the male?

Variants of answer:

- a) on the glans penis;
- b) in the vestibule;
- c) at the root of the penis;
- d) at the apex of the bladder;
- e) in the bulb of the penis.

22. The male urethra is missing:

Variants of answer:

- a) pars prostatica;

- b) pars membranacea;
- c) pars spongiosa;
- d) pars cavernosa;
- e) there is no right answer.

23. The length of the male urethra:

Variants of answer:

- a) 12 cm;
- b) 15 cm;
- c) 18 cm;
- d) 20 cm;
- e) 22 cm.

24. Not applicable to deferent ways:

Variants of answer:

- a) the duct of the epididymis;
- b) the vas deferens;
- c) ejaculatory duct;
- d) fallopian tube;
- e) rete testis.

25. Female genital system does not include:

Variants of answer:

- a) the ovary;
- b) uterus;
- c) the fallopian tube;
- d) the seminal vesicle;
- e) vagina.

26. Is not typical for the ovary:

Variants of answer:

- a) basis ovarii;
- b) margo liber;
- c) margo mesovaricus;
- d) hilum ovarii;
- e) extremitas tubaria.

27. In the uterus is not isolated:

Variants of answer:

- a) fundus;
- b) corpus;
- c) basis;
- d) cervix;
- e) isthmus.

28. Departments of the fallopian tube:

Variants of answer:

- a) infundibulum;
- b) ampulla;
- c) pars uterine;
- d) isthmus;
- e) all answers are correct.

29. The length of the fallopian tube on the average:

Variants of answer:

- a) 5–8 cm;
- b) 8–10 cm;
- c) 10–12 cm;
- d) 12–14 cm;
- e) 14–16 cm.

30. The length of the vagina, on average:

Variants of answer:

- a) 12 cm;
- b) 4 cm;
- c) 6 cm;
- d) 8 cm;
- e) 10 cm.

31. By the vagina adjoins:

Variants of answer:

- a) sigmoid colon;
- b) adrenal gland;
- c) the rectum;
- d) the jejunum;
- e) the right kidney.

32. Do not open in the vestibule vaginae:

Variants of answer:

- a) ducts are small glands vestibule;
- b) channels of large vestibular glands;
- c) the opening of the vagina;
- d) opening of the ureter;
- e) the external opening of the urethra.

33. At the clitoris is missing:

Variants of answer:

- a) corpus;

- b) glans;
- c) crus;
- d) collum;
- e) there is no right answer.

34. Ligaments clitoris is:

Variants of answer:

- a) lig. suspensorium clitoridis;
- b) lig. capitis clitoris;
- c) lig. latae clitoris;
- d) lig. teres clitoris;
- e) lig. clitoris proprium.

35. The organs of the mediastinum are not:

Variants of answer:

- a) cor;
- b) pulmo;
- c) arteria pulmonalis;
- d) trachea;
- e) esophagus.

36. To the muscles of the perineum are:

Variants of answer:

- a) m. levator ani;
- b) m. coccygeus;
- c) m. bulbospongiosus;
- d) m. ischiocavernosus;
- e) all answers are correct.

STANDARD OF ANSWERS TO THE TEST TASKS

№ question	Correct answers	№ question	Correct answers	№ question	Correct answers	№ question	Correct answers
1	a	10	a	19	e	28	e
2	b	11	e	20	b	29	c
3	d	12	e	21	a	30	d
4	b	13	d	22	d	31	c
5	d	14	b	23	c	32	d
6	c	15	d	24	d	33	d
7	a	16	c	25	d	34	a
8	a	17	a	26	a	35	b
9	c	18	d	27	c	36	e

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АППАРАТ**
(на английском языке)

**Учебно-методическое пособие
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для зарубежных стран, обучающихся на английском языке,
учреждений высшего медицинского образования**

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