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UZHHOROD NATIONAL UNIVERSITY
MEDICAL FACULTY**

COURSE OF UROLOGY

S.O.Boiko, V.V.Rusin, S.Sh.S.Boiko

**CONTENT MODULE 1
CLINICAL ANATOMY, PHYSIOLOGY, METHODS OF RESEARCH OF URINARY
AND MALE GENITAL SYSTEM
(CHAPTER 1)**

*(Guidelines for self-preparation of 4th year students
Medical Faculty 2 of Urology)*

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Reviewer: doctor of medical sciences, professor Boldizhar P.O.,
head of the Department of Surgical Diseases
Uzhhorod National University

doctor of medical sciences, professor Rummyantsev K.E.,
professor of the Department of Surgical Diseases
Uzhhorod National University

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PREFACE

The study of any clinical discipline is impossible without mastering the skills of semiotics and disease diagnosis. This knowledge should be mastered by every future doctor, regardless of the profession he chooses.

Deep knowledge of clinical anatomy and semiotics of urological diseases will significantly help the doctor in the clinic during the examination of patients, differential diagnosis and selection of the most optimal method of treatment.

Science does not stand still, new and new clinical research methods are constantly appearing, so in this extremely large arsenal of possibilities the doctor should not get lost. The doctor should always be accompanied by the correct orientation in the choice of different research methods, preference should be given to the simplest, but at the same time the most indicative methods.

The recommended methodical instructions are constructed according to the last requirements on condition of the credit-modular system of the organization of educational process. This includes the availability of the most optimal input of information that the student should receive in preparation for a particular lesson, and different levels of complexity of tests and situational tasks for self-monitoring of the material studied.

Methodical instructions are made according to the program of urology for students of higher medical educational institutions of III-IV levels of accreditation approved by the Central methodical office on higher medical education of the Ministry of Health of Ukraine (Kiev, 2008).

Part 1 of the guidelines to the content module 1 includes 2 topics that are basic in the work of a urologist and have a practical focus.

Professor S.O. Boiko

Content module 1. Clinical anatomy, physiology, methods of research of urinary and male genital system. Malformations of the genitourinary system.

Specific goals:

1. To determine the place of urology in the system of medical knowledge, the main stages of development of urology as a science.
2. Explain the anatomical features of the structure of the urinary and male reproductive systems.
3. Determine renal colic and be able to differentiate it from acute surgical diseases of the abdominal cavity.
4. Explain the mechanism of development of prerenal, renal and postrenal anuria.
5. Perform palpation of the kidney, bladder, urethra, prostate, scrotum.
6. Evaluate the results of X-ray, radionuclide, thermographic and ultrasound examinations.
7. Analyze the features of the clinical course of abnormalities in the development of the urinary and male reproductive systems.
8. Catheterize the bladder.
9. Perform cystoscopy, urethroscopy, ureteroscopy, pyeloscopy, ureteral catheterization, stent placement.
10. Perform blockade of the elements of the vas deferens of men and the round ligament of women.
11. Provide emergency care for renal colic, acute urinary retention, hematuria, anuria, phimosis, paraphimosis.

THE PLACE OF UROLOGY IN THE SYSTEM OF MEDICAL KNOWLEDGE, THE MAIN STAGES OF DEVELOPMENT OF UROLOGY AS A SCIENCE

The first memories of specialists who study diseases of the urinary system appear in ancient times. Thus, Herodotus of Halicarnassus (484-425 BC), an ancient Greek traveler who was called the "father of history", told about the Egyptian art of healing in the days of Pharaoh Amaz (560-526 BC): "Every physician studies only one disease, not several, around – only doctors. There are specialists of urine".

Ancient Greek physicians of the Koss and Cnidus schools already knew four kidney diseases: chronic pyelonephritis with dysuric disorders, urolithiasis with renal colic, tuberculosis, and a disease corresponding to the manifestations of modern renal vein thrombosis and papillary necrosis.

The founders of modern urology and nephrology, since ancient times, are: Hippocrates, Aristotle, Herophilus, K. Galen, Theophilus.

A. Vesalius (1514-1564) is generally considered to be the founder of modern anatomy of the kidneys and urinary tract. In addition, a little earlier there were reports with a detailed description of the structure of the kidneys, ureters and bladder (Mondino de Luzzi (1275-1326 - Professor of the University of Bologna)) and carefully made drawings of the relationship of the kidneys to other organs (Leonardo da Vinci) (1452-1519).

Urology is considered one of the oldest specialties and belongs to the field of medicine, which is developing most dynamically. It has its roots far back in ancient times. Thus, in the time of Hippocrates (460-370 BC) there were "stonemasons" - people who knew how to remove stones from the bladder by intermediate access. Avicenna (980-1037) in the "Canon of Medical Science" described in detail the technique of operations how to remove stones from the bladder and catheterization of the bladder. Georgian medical books of the XI century describe the method of removing stones from the bladder and urethra, the first tools for this operation are given.

The founder of surgery in urology is considered to be the French barber of the Renaissance A. Pare (1510-1590), who initiated the use of ligatures to prevent bleeding. Methods of catheterization and puncture of the bladder, perineal urotomy were developed by the French physician F.J. La Peyronie (1678-1747).

The founder of urology, as a separate medical discipline, is considered to be F. Diaz (1525-1590), who wrote a monograph ("Treatise" (1588)), which was devoted to the causes, clinic, diagnosis and treatment of urological diseases, techniques of operations on the urinary tract, description of special urological tools.

The beginning of domestic urology dates back to the eighteenth century. Thus, the chief surgeon of the Kronstadt Maritime Hospital M.I. Shein (1712-1762) described in detail the structure of the bladder and external genitalia in men, features of symptoms and treatment of urethral strictures, orchoepididymitis and bladder stones. The formation of urology is closely connected with Professor E.O. Mukhin (1766-1805), a native of Chuguev, Kharkiv province. For the first time, urology was separated from surgery into an independent subject of medical education by Professor of the St. Petersburg Medical and Surgical Academy P.P. Zablocki-Desiatowski (1814-1882). He is the author of works devoted to the study of diseases of the testis, spermatic cord and scrotum, prostate.

An extremely large contribution to the development of domestic urology was made by the Ukrainian urologist P.N. Savenko (1795-1843), who performed lithotomy with great skill and was an active advocate of new methods of diagnosis and treatment of diseases of the urinary system. He is the author of scientific articles and a monograph on the surgical treatment of urinary stones.

Prominent Ukrainian surgeon, professor M.V. Sklifosovsky (1836-1904) developed an operation to remove stones from the bladder through abdominal dissection, proposed a suture of the bladder, described in detail *sectio alta*.

Diseases of the male genital organs were first studied in Russia by F.I. Sinitsyn (1835-1907), about which he is considered the founder of andrology.

The first planned nephrectomy was performed in 1869 in Heidelberg by the German surgeon G. Simon (1824-1876). In his book, *Kidney Surgery*, he wrote: "I performed a good kidney extirpation, which should eradicate the view of the inviolability of this organ. I hope that kidney surgery, especially kidney extirpation, will save the lives of many patients. "

In the Russian Empire, the first nephrectomy was performed by Y.F. Kosinsky (1833-1914) in women with calculous pyonephrosis.

One of the first, in 1909 V.F. Voino-Yasenetsky (1877-1961) performed a transvesical adenomectomy.

The history of modern urology dates back to the eighteenth century, when in 1798 the first clinic of surgical diseases was established at the St. Petersburg Medical and Surgical Academy, headed by I.F. Bush (1771-1843). The clinic was equipped with special urological instruments (urethral dilators, lithotomes, elastic urinary catheters). Bush I.F. described the technique of operations on the external genitalia in men.

The first specialized urological department was created by S.P. Fedorov (1869-1936). On his initiative, the Russian Urological Society was organized. Fedorov S.P. was the first in the Russian Empire to use cystoscopy with catheterization of the ureters, designed a number of special urological instruments. He was one of the first in Europe to successfully perform suprapubic prostatectomy. In addition, he began lecturing on the treatment of urological pathology.

V.A. Oppel (1872-1932) was actively involved in the study of phthisiourology.

In the early twentieth century, the Russian surgeon B.N. Holtsov (1861-1940) proposed methods of treatment of fistulas and narrowing of the urethra, as well as removal of bladder tumors and prostate adenoma.

A.P. Frumkin (1897-1962) initiated the use of X-ray contrast agent in urological practice and published the "X-ray atlas of surgical diseases of the genitourinary system." He later published the *Cystoscopic Atlas*.

The heyday of Russian urology is directly related to the organization in 1952 of the Department of Urology and Operative Nephrology at the II Moscow Medical Institute named after M.I. Pirogov, which in 1953 was headed by A.Y. Pitel (1902-1982), and later - his student

M.O. Lopatkin. The Institute of Urology at the II Moscow Medical Institute named after M.I. Pirogov is created. Under the leadership of A.Ya. Pitel, methods of renal angiography, surgical treatment of neurogenic arterial hypertension, hemodialysis and kidney transplantation were introduced into clinical practice. Thanks to M.O. Lopatkin, endoscopic operations, remote lithotripsy, various types of contact lithotripsy, problems of venous renal hypertension, male erectile dysfunction, original plastic operations on the upper urinary tract were actively used in urology clinic. Academician M.O. Lopatkin was the director of the Institute of Urology. He took an active part in the creation of the complex "Urat-2" for non-contact crushing of kidney stones, introduced into clinical practice kidney transplantation.

Academician B.V. Petrovsky in 1965 for the first time in the USSR performed a kidney transplant from a living donor, and in 1966 M.O. Lopatkin and Y.M. Lopukhin performed a transplant of a cadaveric kidney.

History of Ukrainian urology

V.A. Karavaev (1811-1892) is rightly considered the patriarch of the Kiev school of surgeons, performed about 1,000 lithotomies and more than 200 urethrotomies.

In 1863, T.I. Vdovykovsky organized the first specialized urology department with 25 beds in Odessa. He is the author of many works on the diagnosis and treatment of urological diseases.

A.G. Podrez (1852-1900) - Professor of Kharkiv University, became a pioneer in teaching urology in his clinic, was the author of the first domestic guide to urology. The first performed prostatectomy through an arcuate peritoneal autopsy. He first performed a partial bladder prostatectomy. In 1897, A.G. Podrez performed nephrectomy for renal carbuncle and apostematous nephritis for the first time in the country.

Yu.Yu. Voronoi (1895-1961) was the first in the world in 1933 to perform a cadaveric kidney transplant in a 26-year-old woman with sulema poisoning from a 60-year-old man who died as a result of a craniocerebral injury. Although the patient died on the second day after surgery (due to incompatibility of blood), this event will be eternal in the memory of world science.

In 1924, the Department of Urology was established at the University of Kiev, headed by A.A. Chaika (1881-1968). He organized the Ukrainian Scientific Society of Urologists. A.A. Chaika's scientific activity was devoted to the issues of kidney and urinary tract injuries, purulent urology, diseases of the prostate gland and seminal vesicles.

V.I. Shapoval (1924-1998) was the founder of the Kharkiv Regional Nephrourological Center.

V.S. Karpenko for a long time headed the Kyiv Institute of Kidney and Urinary Tract Diseases (Institute of Urology and Nephrology). In 1972 he performed the first successful kidney transplant in Ukraine to a 26-year-old patient from a brother donor. In 1964, Viktor Stepanovych removed the embolus from the pulmonary artery.

E.Ya. Baran is one of the members of the team that performed the first kidney transplant in Ukraine. From 1977 he headed the kidney transplant department, and in the period from 1983 to 2001 he was the chief transplant specialist of the Ministry of Health of Ukraine.

P.S. Sernyak headed the Department of Urology created for the first time at the Donetsk Medical Institute. In 1986 he performed the first kidney transplant in Donbass.

O.F. Vozianov, who headed the Department of Urology of the Kyiv Medical Institute and was the director of the Institute of Urology and Nephrology (Institute of Urology). Alexander Fedorovich founded the first laboratory of thermodiagnosics in Ukraine, opened the first department of extracorporeal lithotripsy. Under his leadership, research was conducted to study the impact of radiation pollution after the Chernobyl accident on the cellular and molecular mechanisms of bladder and kidney cancer.

History of the course of urology of the medical faculty of Uzhhorod National University

The course of urology was established in 1963 at the Department of Faculty Surgery. The course was headed by Ivan Alexandrovich Kovalchuk (Fig. 1), who was a surgeon, assistant of the department, at the suggestion of associate professor P.O. Isaev. Since then, Ivan Alexandrovich, along with the practice of surgeon, introduced the teaching of urology at the Medical Faculty of Uzhhorod State University.

In 1978, the course of urology was separated from the Department of Faculty Surgery and joined the Department of Hospital Surgery and moved to the base of the urology department of the regional hospital. Research on the course was devoted to various problems of urology. The most significant are the study of andrological consequences of resection of stomach in men, which formed the basis of I.O. Kovalchuk's doctoral dissertation. Relevant to the course was the study of urolithiasis and nonspecific inflammatory processes of the kidneys, urosepsis, bladder cancer. Ivan Alexandrovich made a lot of efforts to establish creative ties with the II Moscow Medical Institute, Patrice Lumumba University of Friendship of Peoples, All-Russian and Kyiv Research Institutes of Urology, Dnipropetrovsk Medical Academy. In 1990, with the active participation of the course of urology, a congress of urologists was held in Uzhhorod, which was attended by Academician of the USSR Academy of Medical Sciences M.O. Lopatkin (Moscow).

In co-authorship with Academician O.F. Vozianov and Corresponding Member O.V. Lyulko, I.O. Kovalchuk published the Atlas-Guide to Urology, which became a table book for urologists and students.

Ivan Alexandrovich's contribution to the training of urologists is great. For many years he was the chairman of the Association of Urologists of Transcarpathia.

In 2003-2005, the course of urology was headed by phd. D.I. Kovalchuk.

Since 2005 the course of urology is headed by professor S.O. Boiko. After the unification of the departments of hospital and faculty surgery, the department of surgical diseases was created, in the structure of which the course of urology remained. The scientific direction of the course of urology is the improvement of methods of diagnosis and treatment of oncurological pathology, in particular: kidney cancer complicated by tumor thrombosis of the inferior vena cava; prostate cancer; bladder cancer.

The clinical base of the urology course is the urology department of the A.Novak Transcarpathian Regional Clinical Hospital.

Methodical development of a practical lesson on the topic 1:

ANATOMY AND PHYSIOLOGY OF THE URINARY AND MALE REPRODUCTIVE SYSTEMS

Actuality of theme:

Knowledge of clinical anatomy and physiology of the urinary and male reproductive system is a necessary basic component in the study of etiopathogenesis, clinic, diagnosis and treatment of diseases of the genitourinary system.

The purpose of the lesson:

To repeat the structure and function of the genitourinary system and to acquaint students with the methods of examination of urological patients.

Theoretically, students should know:

1. Anatomical structure of the kidney, ureter, bladder, urethra, prostate, testis, penis.
2. Methods of examination of the urinary and male reproductive system.
3. The main pathological processes are palpatory simulating kidney diseases.
4. Differential diagnostic value of changes in the contours of the lumbar region.
5. Diagnostic value symptom of "tapping" on the lumbar region.
6. The main pathological processes that lead to enlargement of the bladder.
7. Diagnostic value of examination, palpation and percussion of the bladder.
8. Differential diagnosis between benign prostatic hyperplasia and prostate cancer based on finger rectal data examination of prostate.
9. Changes in the prostate during its inflammation. Diagnostic value of prostate secretion analysis.
10. Diagnostic value of examination and palpation of the urethra.
11. Diagnostic value of examination and palpation of the scrotum and penis.
12. Differential-diagnostic value of diaphanoscopy.

Practically students should be able to:

1. Perform examination of the kidneys and palpation of the kidneys.
2. Perform percussion of the kidneys (identify Pasternatsky's symptom).
3. Perform palpation, percussion of the bladder.
4. Perform finger rectal examination of prostate, and prostate massage.
5. Perform examination and palpation of the urethra.
6. Perform palpation of the scrotum, its organs and penis.
7. Perform a diaphanoscopy.

Program issues in student preparation:

1. Organs of the urinary and male reproductive system, their functional significance.
2. Clinical anatomy of the urinary and male reproductive systems.
3. Name the types of kidney motility.
4. Name the factors of kidney fixation in the retroperitoneal space.
5. Name the most common areas of damage to the ureter in women during gynecological and obstetric operations.
6. Name the methods of palpation of the kidneys.

TOPIC CONTENT

Habitus - physique, appearance.

Diaphanoscopy- examination of the organs of the scrotum (irradiation) with a light source. A light source is brought to the scrotum, and the contents of the scrotum, which is translucent, are observed on the opposite side. A useful method in the differential diagnosis of hydrocele and inguinal hernia. In the case of hydrocele, there is a complete translucency of the formation,

which is filled with fluid. If the hernia contents are the intestine or omentum, full translucency of the formation is not observed, the glow will not be bright, or dark areas will be visible on its background.

Scrotum - saccular skin-muscle formation in the perineum of a man, which contains the testicles and their appendages.

Shumlyansky-Bowman capsule- consists of a visceral leaflet, which is closely adjacent to the capillary loops of the vascular glomerulus, and a parietal leaflet. The vascular glomerulus together with the capsule functions as an ultrafiltration organ.

The cortical substance of the kidney - glomeruli and tortuous parts of the proximal and distal tubules together with the interstitial connective tissue that surrounds it and which contains blood, lymphatic vessels, nerves.

The medulla substance of the kidney - a complex formed by Henle's loops, collecting tubules and Bellini channels.

Nephron- structural and functional unit of renal tissue. Each nephron consists of a vascular glomerulus - glomeruli, glomerular capsules and renal tubules.

Kidney - a pair of bean-shaped organ located in the retroperitoneal space on both sides of the spine at the level of the XII thoracic-II lumbar vertebrae.

Pelvis - part of the upper urinary tract, which collects urine, which is excreted by the kidneys and comes from the cups for longer transport through the ureter into the bladder.

Renal tubules- continuation of the glomerular part of the nephron, long tubes with single-layer walls. Consistently distinguish: proximal tortuous canal, passing into a straight line, and then into the Henle loop (consisting of a thin descending segment and a thick ascending). The Henle loop turns into a distal tortuous canal. Distal convoluted canal sections are connected with a system of collecting tubules, which, merging, form Bellini tubules (ducts), which open in pores at the top of the papilla.

Prostate - male genital organ, which is located under the bladder and surrounds the initial (prostatic) part of the urethra. Produces prostatic juice, which is one of the components of the final sperm. Produces prostate-specific antigen (PSA), which is a screening marker in the diagnosis of prostate cancer.

Testicular appendage- an elongated organ 5-6 cm long, 0.5-1 cm wide, adjacent to the upper pole and the posterior surface of the testicle. In the epididymis of the testis is the process of maturation of sperm.

Ureter - a long and narrow tubular organ that connects the pelvis to the bladder and is located in the retroperitoneal space.

Urinary-bladder segment consists of the juxtavesical section of the ureter (3-4 cm of its terminal part), the wall of the bladder with the ureter, which passes in its thickness and ends with the ureter. The composition of the ureteral-bladder segment includes the bladder triangle and the posterior urethra.

Urinary tract - a set of anatomical formations in which urine accumulates and is excreted.

Bladder - hollow organ, which distinguishes the middle part (body), top, bottom and neck, which passes into the urethra. Located in the pelvic cavity, and when filled rises into the abdominal cavity. Urine accumulates in the bladder.

Urethra - in men, a tortuous tube 18-21 cm long, which begins with the bladder and ends with an external hole at the top of the head of the penis. Urine and finally formed semen are excreted through the urethra. The female urethra starts from the bladder and is a straight tube 3.5-4 cm long and ends with an external opening in the dorsum of the vagina below the clitoris.

The vas deferens - narrow tubular (paired) organ 30-35 cm long with an outer diameter of 0.3-0.5 cm and an inner lumen with a diameter of 0.1-0.2 cm, connecting the epididymis with the prostatic urethra and seminal vesicle. The organ involved in conducting sperm.

Seminal vesicle - paired organ of irregular shape, size 6x4 cm. Located behind and below the bladder, above the prostate in the space in front of the rectum.

Testosterone - a steroid hormone from the group of androgens, which is produced mainly

in the testicles.

Fornical apparatus - anatomical and functional formation consisting of the vault of the cup with epithelial cover (urothelium), fornic muscle sphincter (vault sphincter), muscle that raises the vault (levator), renal sinus tissue, elastic fiber mesh and interstitial connective tissue containing many nerve elements, blood and lymph vessels.

Juxtamedullary nephrons - nephrons, which are almost entirely located in the cerebral part of the kidney. Their glomeruli are located on the border between the cortical and cerebral matter (in the cortico-medullary area), and the Henle loop almost borders the renal papilla. These nephrons are responsible for the formation of malignant hypertension (neurogenic) and are a component in the renin-angiotensin system.

Testicle - the paired male gonad, which is located in the scrotum, measures 5x3 cm and produces androgens (testosterone) and is the site of sperm development.

Urinary organs:

- 1) kidneys, renes (nephros);
- 2) ureters;
- 3) bladder, vesica urinaria (cystis);
- 4) urethra.

Male genitals organs:

- 1) prostate;
- 2) seminal vesicles, vesiculi seminales;
- 3) glands of the bulb of the urethra, glanduli bulbourethrales;
- 4) testicles, testes (orchis);
- 5) epididymis;
- 6) ejaculatory ducts, ductus deferens;
- 7) spermatic cord, funiculus spermaticus;
- 8) scrotum;
- 9) penis.

Kidney

The organ of the retroperitoneal space. Dimensions: length - 10-12 cm, width - 5-6 cm, thickness - 4 cm. Each kidney has anterior and posterior surfaces, lateral and medial edges, upper and lower ends (poles). The gate of the kidney is represented: in front - veins; arteries and nerves - behind the veins; renal pelvis and ureter - behind the arteries. Each kidney is surrounded by a fat capsule and a renal fascia. Directly, the kidneys are covered with a dense fibrous capsule.

The renal parenchyma is represented by cortical and cerebral substances. The cerebral substance is represented by 10-15 cone-shaped renal pyramids, the bases of which are directed towards the outer surface of the kidney. The cortex is 5-7 mm thick, covers the pyramids and gives between them processes - renal columns, which are directed to the center of the kidney. The tops of the pyramids, merging by 2-3, form a protruding papilla in the renal sinus. The number of papillae can be 7-8, and at the top of the papilla is from 10 to 55 holes. Each papilla is covered by a funnel-shaped cavity - a small cup, which can sometimes cover 2-3 papillae. Several small cups are combined into a large cup, which can be 2-3. Large cups are connected in a renal bowl.

The right kidney is located at the level of the XII thoracic and upper edge of the IV lumbar vertebra, the left - at the level of the XI thoracic and upper edge of the III lumbar vertebra. The right kidney intersects the XII rib at the border of the upper and middle thirds, the left kidney - almost in the middle.

Syntopia of the right kidney. Above the upper pole is the right adrenal gland; anterior: upper 2/3 - right lobe of the liver, lower 1/3 - right bend (hepatic angle) of the colon;

medially - the descending part of the duodenum.

Syntopia of the left kidney. Above the upper pole is the left adrenal gland; anterior: upper 1/3 - posterior wall of the stomach, middle 1/3 - tail of the pancreas, lower 1/3 medially - sinus of the mesentery and loop of the jejunum, lower 1/3 laterally - left bend of the colon; laterally - the spleen.

The vascular leg of the right kidney is short, medially the kidney is in contact with the inferior vena cava. The vascular leg of the left kidney is long, so the kidney is at a distance from the abdominal aorta and vena cava.

The kidneys have three types of mobility:

- 1) respiratory - associated with respiratory movements of the chest and anterior abdominal wall (from 1.5-3 to 3-5 cm);
- 2) static - manifests itself in the transition of a person from horizontal to vertical position or vice versa (1-2 cm);
- 3) palpation - the distance at which you can move (down and medially) the kidney on palpation (3-5 cm).

Factors of kidney fixation in the lumbar region of the retroperitoneal space:

- ligaments: spleno-renal ligament (lig. splenorenale), hepato-renal ligament (lig. hepatorenale), duodeno-renal ligament (lig. duodenorenale);
- renal artery and vein;
- kidney fat capsule (main);
- renal fascia;
- shape and depth of the renal bed;
- intraperitoneal pressure (main);
- muscle tone of the anterior abdominal wall (main).

The hollow system of the kidney is represented by cups and a bowl. There are three groups of cups:

- 1) group of the upper cup;
- 2) middle cup group;
- 3) group of the lower cup.

The renal pelvis may have different options for placement in the kidney:

- completely intrarenal;
- intrarenal;
- extrarenal;
- completely extrarenal.

Pelviureteral (pelvic-ureteral) transition - the narrowest part of the urinary tract, plays the role of a physiological sphincter and regulates the release (emptying) of the hollow space of the kidney.

Ureter

Paired organ of retroperitoneal space. Dimensions: length in men - 30-32 cm, in women - 27-29 cm; diameter at the point of departure from the pelvis, at the entrance to the pelvis and when passing through the bladder wall - 3-4 mm, and between these narrowings (in the enlarged areas) - 0.5-1.0 cm.

There are three parts of the ureter: abdominal, pelvic and intramural. The abdominal part of the ureter is surrounded by loose tissue, due to which it has considerable mobility and can be easily moved to the sides. In the area of the bottom of the bladder, the ureter in the oblique direction passes through its wall, forming an intramural part, which opens into the cavity of the bladder through a slit-like opening. The length of the intramural part is about 2 cm, this anatomical structure provides an additional antireflux mechanism of urine flow from the bladder into the upper urinary tract.

The wall of the ureter is represented by three membranes: connective tissue, muscle and mucosa. The muscular membrane consists of three conditional layers: inner and outer - longitudinal, middle - circular, which should be considered as a whole, because muscle bundles form plexuses that go obliquely, longitudinally and transversely. The outer muscular layer is better developed in the lower part of the ureter. The mucous membrane forms longitudinal folds, due to which the lumen of the ureter acquires a star shape.

In the area of the upper and middle third of the ureters, they intersect with the testicular or ovarian vessels. In the lower part, at the level of the terminal line, the ureters pass in front of the common iliac vessels and form a section with them. Above the junction, the ureters with their posterior surface touches n. genitofemoralis, which explains the irradiation of pain when passing a stone through the ureter into the groin area, the penis in men and the labia majora in women. In men, just before entering the bladder, the ureter is crossed by the vas deferens, which is located medially from it.

In women, the lower parts of the ureters pass in close proximity to the uterus, make a cross with wide ligaments of the uterus and uterine vessels (located below the vessels), and before entering the bladder touch the anterior wall of the vagina and then cross the anterior lateral wall of the vagina and enters the bladder. The close connection of the ureter with the genitals in women is the main cause of its trauma during gynecological and obstetric operations. The most common anatomical areas of injury are:

- the area of the intersection of the ureter with the ovarian vessels;
- the area of the intersection of the ureter with the uterine artery;
- vesico-vaginal space, where the ureter is adjacent to the cervix and vaginal wall.

Bladder

A hollow organ consisting of several parts. The upper anterior part of the bladder forms the apex, which passes upwards towards the navel into the middle umbilical ligament, which connects the bladder with the navel. The posterior-lower part of the bladder is represented by its bottom. This is the least mobile part of the bladder. In men it is directed towards the rectum, in women - towards the vagina. The anterior-inferior part is an elongated part of the bladder that makes up its neck. The inner opening of the urethra is located in the neck. The main part of the bladder is represented by its body, which distinguishes the anterior, posterior and lateral walls. The posterior wall is covered with peritoneum. The wall of the bladder consists of mucous, muscular and connective tissue membranes and partially the peritoneum.

The mucous membrane is represented by a multilayered transitional cell epithelium (urothelium - according to modern nomenclature) with a well-defined submucosal layer (except for the area of triangles), which provides the formation of numerous thick folds. These folds when filling the bladder are stretched, which provides a reservoir function of the bladder. In the area of the bottom of the bladder is the bladder triangle, which is turned in the direction of the apex, and the top - in the direction of the neck of the bladder. In the corners of the base of the triangle are the cells of the right and left ureters, which are interconnected by an interurethral fold. At the top of the triangle is the inner opening of the urethra. The area of the bladder triangle is devoid of folds due to the absence of the submucosal layer and therefore, it is tightly fused with the muscular layer. Baroreceptors are laid in this area.

The muscular membrane is thick, consists of three layers: outer - longitudinal, middle - circular (the most massive layer, which in the neck forms the sphincter of the bladder), inner - longitudinal and partially oblique (the weakest layer developed only in the bottom of the urinary tract). Longitudinal muscle fibers of the bladder pass into the urethral wall directly under the mucous membrane (in men - along the prostatic and membranous parts, in women - for its entire length). Circular and spiral muscle fibers also end in the urethral wall.

The upper posterior and partially lateral surfaces of the bladder are covered with peritoneum. The peritoneum, which passes from the posterior wall of the bladder to the posterior surface of the abdominal wall, forms a transverse-bladder fold and in men passes to the rectum,

and in women to the uterus.

The anterior surface of the bladder is adjacent to the pubic junction and the horizontal branches of the pubic bones and is separated from them by a leaf of the prostate fascia.

In men, the bottom of the bladder is adjacent to the seminal vesicles, vas deferens, partially prostate, anterior wall of the rectal ampoule.

In women, the bottom of the bladder is adjacent to the cervix and the anterior wall of the vagina.

The arteries of the bladder begins from internal iliac artery. The upper part of the bladder is fed by branches a. vesicalis superior, bottom - a. vesicalis inferior. In addition, the bottom of the bladder is supplied with blood by branches a. rectalis media, a. pudenda inferior, a. obturatoria. Each lower artery of the bladder supplies blood to the lower part of the ureter in both sexes, and in men - the seminal vesicles and prostate. In women, blood also enters the bladder from the internal pubic and vaginal arteries.

The veins of the bladder go independently, without accompanying the corresponding arteries. Veins form three plexuses: pubic, vesical and hemorrhoidal. The venous network around the bladder is 15-20 times larger than the arterial. In men, the vesical plexus extends to the prostate gland (its lateral surfaces) and collects blood from the wall of the bladder, prostate, seminal vesicles, the end of the vas deferens. In women, it spreads to the initial part of the urethra and collects blood from the bladder wall and urethra. Venous outflow disorders play a significant role in the pathogenesis of inflammatory diseases of the bladder and prostate.

Normal bladder capacity in men is 200-300 ml, in women - 200-500 ml. When this capacity is reached, there is a flow of afferent impulses from mechano- and baroreceptors to the spinal centers of urination (LII-III, SII-IV). The amount of urination is 5-6 times a day.

Urethra

The urethra in men is a tube 18-25 cm long and 5-7 mm wide. The urethra ends with an external opening at the top of the head of the penis. Anatomically, there are three parts of the urethra: prostatic, membranous, spongy. The urethra has two curves: the upper (physiological, non-permanent, subpubic - in the area of transition of the membranous to spongy) and lower (anatomical, permanent, prepubic - envelops the symphysis. Anatomical extensions: prostatic part, in the area of the bulb, shuttle - shaped fossa.

There is a seminal tubercle in the prostatic urethra, the hump on top of which there is a deepening - a prostatic pistil on which sides seminiferous channels open. Numerous openings of ducts of prostate glands open in this part of an urethra. The ducts of the bulbourethral glands, which are located between the fascial plates of the urogenital diaphragm, open into the membranous part of the urethra. Multiple ducts of paraurethral glands (Littre's glands) open in a spongy part of an urethra.

The urethra in women is much shorter and wider than in men (length 3-5 cm, width about 1 cm). It has an almost straight direction, describing a small arch under the pubic bones (which should be considered when catheterizing and inserting instruments into the bladder). Due to these features, urination is much easier than in men. In women, there is almost no urinary retention, but much more often there are acute and chronic inflammatory processes in the bladder and upper urinary tract due to the penetration of ascending infection. The outer opening of the urethra opens into the dorsum of the vagina. Paraurethral (skin) glands are located around the anterior part of the urethra. Their obstruction causes a paraurethral cyst, which may become puss field.

Urination

Urination is continuous, going through many stages. In some of them, urine enters a kind of reservoir, where it can be delayed for some (short) time. This short-term delay (normal) does not adversely affect the function of the renal parenchyma. At the same time, urinary retention (even short-term) can cause the death of some nephrons.

The excretory function of the upper urinary tract begins with a system of collecting renal tubules, which are located in the parenchyma of the kidney. Active urine transport begins at the level of the cups. The cups, which are surrounded by the parenchyma, contain the largest number of muscle formations that play an important role in the passage of urine. The renal pelvis shrinks 3-8 times (on average 4-5 times) per minute. The renal pelvis is almost never completely cleared of urine.

The function of the ureter is the continuous and rapid transport of incoming urine. In addition, the ureters are involved in the reabsorption of urine through the urothelium, diffusion and mechanical mixing of urine. The rate of urine advancement is the same in the abdominal and pelvic areas of the ureters, but is markedly reduced in the intramural region where the accumulation and "compaction" of the final portion of urine, which is rapidly excreted into the bladder.

Bladder function - (reservoir) accumulation of urine to physiological volume, followed by expulsion into the urethra.

The function of the urethra is to hold urine in the bladder and excrete urine during urination.

Normally, 1200-1500 ml of urine is excreted per day. The urge to urinate occurs in the presence of 200-300 ml of urine in the bladder. During the day 60% of the daily norm of diuresis is allocated, at night - 40%.

Prostate

The prostate gland is an unpaired glandular-muscular organ 4-4.5 cm long, 2.5-3 cm wide, 1.5-2 cm thick. It consists of two lateral (right and left) and middle lobes. At its base, the prostate is fused with the neck of the bladder. It covers the prostatic part of the urethra on all sides. The secretion of the prostate is complex and is an integral part of ejaculate, participates in its thinning and ensures the viability of sperm. Figure 1 shows the zonal anatomy of the prostate. Knowledge of zonal anatomy is necessary when performing transurethral resection (TUR) of the prostate.

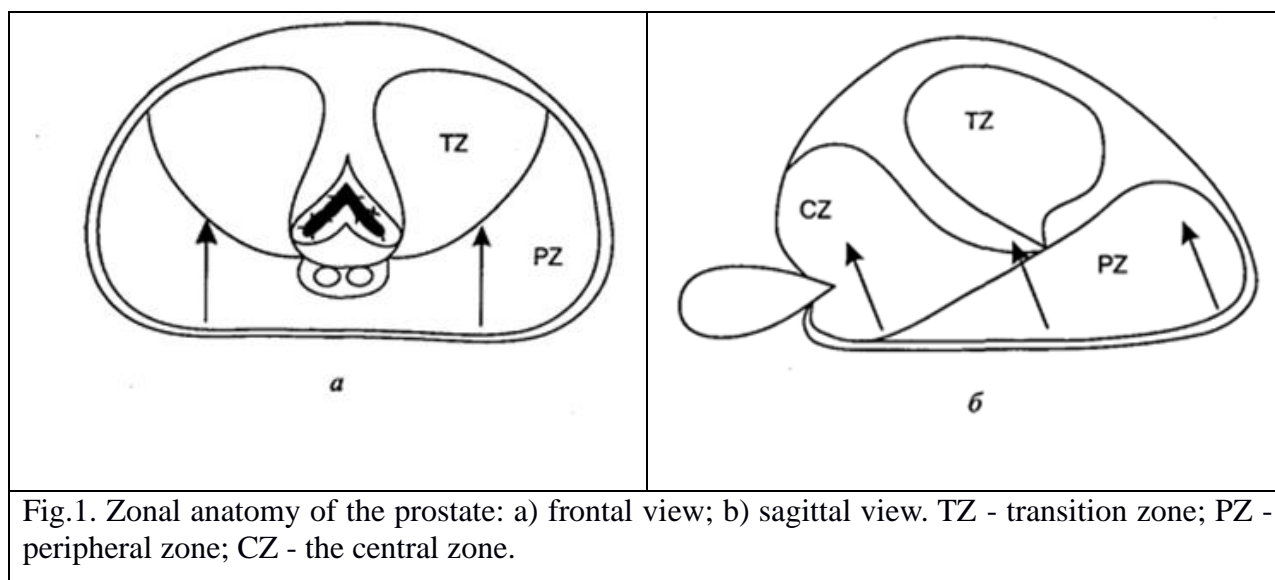


Fig.1. Zonal anatomy of the prostate: a) frontal view; b) sagittal view. TZ - transition zone; PZ - peripheral zone; CZ - the central zone.

Testicle

The testicle is a paired glandular organ 4-5 cm long, 2-2.5 cm wide, 2.5-3 cm thick. In the area of its upper end and posterior edge is above testicle. The testicles develop in the abdominal cavity and by the 7th month of fetal life are directly under the kidneys, after which they gradually descend through the axillary canals and enter the scrotum. The testicle has two shells - the vaginal and the albuginea. The parenchyma of the testis is divided into lobes, which consist of tortuous seminal tubules, which become straight and form a network of testes. Sperm

(germinative function) and testosterone (endocrine function - Leydig cells) are formed in the testicle. There is a hematotesticular barrier between the blood and the testicle.

Penis

In the penis there are head, trunk and root. The length of the penis in an adult man at rest is 9-11 cm, circumference 5-6 cm. The root is a fixed part of the penis, which is hidden under the scrotum and fixed to the bones and urogenital diaphragm. The penis consists of two cavernous bodies and one spongy body. Cavernous bodies - the main structures involved in the erection of the penis, have a multi-cell structure. There are 4 phases of erection: resting phase, swelling, erection, detumescence. The spongy body surrounds the urethra, its tissue is elastic, which ensures the free passage of urine or semen.

Determination of Pasternatsky's symptom

The patient sits or stands with his back to the doctor. The doctor puts his left hand on area XII ribs, and the right knocks on it. You can tap directly on the twelfth rib. If the pain increases, Pasternatsky's symptom is considered positive, if the pain does not occur and does not increase - negative.

Palpation of the kidneys and examination of the lumbar region

1. In a supine position. The doctor sits on the side of the kidney which he palpates, with the brush of one hand moving under the waist, and the fingers of the other hand penetrate the front into the hypochondrium. The hands move towards each other (converge).
2. By Petit. As in the supine position, only the doctor does not move to the opposite side, and remaining in place, moves his hand across the patient's waist in the opposite bone-lumbar angle and moves the front hand to the opposite hypochondrium.
3. By Guyon. During bimanual palpation of the kidney, the latter is subjected to forward thrust-like movements by bending the fingers of the hand, which is located in the costal-lumbar angle.
4. By Israel. Bimanual palpation in the position of the patient on the opposite side of the kidney, which is palpable. The tips of the fingers, which palpate the kidney in front, are not brought under the hypochondrium, but placed slightly lower.
5. By Botkin. In the vertical position of the patient with a slight tilt of the torso forward.
6. By Glenar. In the position of the patient standing. The patient's flank is grasped by the hand in such a way that the thumb is in the hypochondrium and the others are behind the waist. The fingertips of the second hand are placed in the hypochondrium in continuation in the middle of the thumb of the first hand. They try to palpate the kidney during a deep breath and capture it with the thumb.

Swelling in the lumbar region can be observed in paranephritis, tumors of the kidney or retroperitoneal space. Palpation of the kidneys should be performed in different positions of the patient (horizontal on the back, horizontal on the healthy side, vertical). The kidneys become available for palpation with enlargement (tumors, hydronephrosis, pyonephrosis, cystic changes), omission (nephroptosis), abnormalities (dystopia) and in persons with asthenic constitution.

Roberts' symptom. Detected during percussion of the anterior abdominal wall. The zone of a tympanitis over the enlarged kidney is defined as the large intestine is located just under an abdominal wall. In the case of intra-abdominal formation there will be a dull sound.

Examination and palpation of the ureters and bladder

Due to the peculiarity of the anatomical position, it is impossible to examine and palpate the ureters by the usual method. The lower third of the ureters is available for palpation. Its palpation can be performed using bimanual vaginal examination in women. In men, this segment

of the ureters can not be palpated.

The bladder is palpated through the anterior abdominal wall, preferably by bimanual palpation or obstetric type as a pregnant uterus. In addition, the bladder can be palpated through the rectum in men and through the vagina in women.

Swelling over the pubis indicates an overfilled bladder with acute or chronic urinary retention, locally advanced (invasive) bladder cancer, an inflammatory process in the peri-bladder fat.

Digital rectal examination of the prostate

It can be performed in the position of the patient on the right side, on the back and knee-elbow position (Fig. 2). The examination is performed carefully so as not to cause pain to the patient.

Put a rubber glove on your hand. The index finger is lubricated with vaseline or glycerin and inserted into the rectum by moving the finger from bottom to top and forward. The index finger inserted into the rectum determines the size of the prostate, its consistency (doughy, tight-elastic, dense, uniform or uneven, smooth or bumpy), the presence of nodes, isthmus, borders (clear or indistinct), the degree of mobility of the mucous membrane over the gland.

Data of digital rectal examination in benign prostatic hyperplasia: the prostate is enlarged due to one or both lobes, sometimes it is impossible to bypass its entire surface with a finger (reach the base), painless, tight-elastic consistency, middle furrow smoothed, rectal mucosa movable.

Digital rectal examination data for prostate cancer: prostate enlarged, dense (cartilaginous or stony consistency), bumpy, fuzzy borders, rectal mucosa over prostate mobile (in local form of cancer that does not spread beyond the gland capsule) immobile (when running common forms of cancer outside the gland to adjacent organs).

Digital rectal examination data in acute prostatitis or prostate abscess: the prostate is enlarged, tight, sharply painful, and in the case of an abscess - the area of softening is palpated.

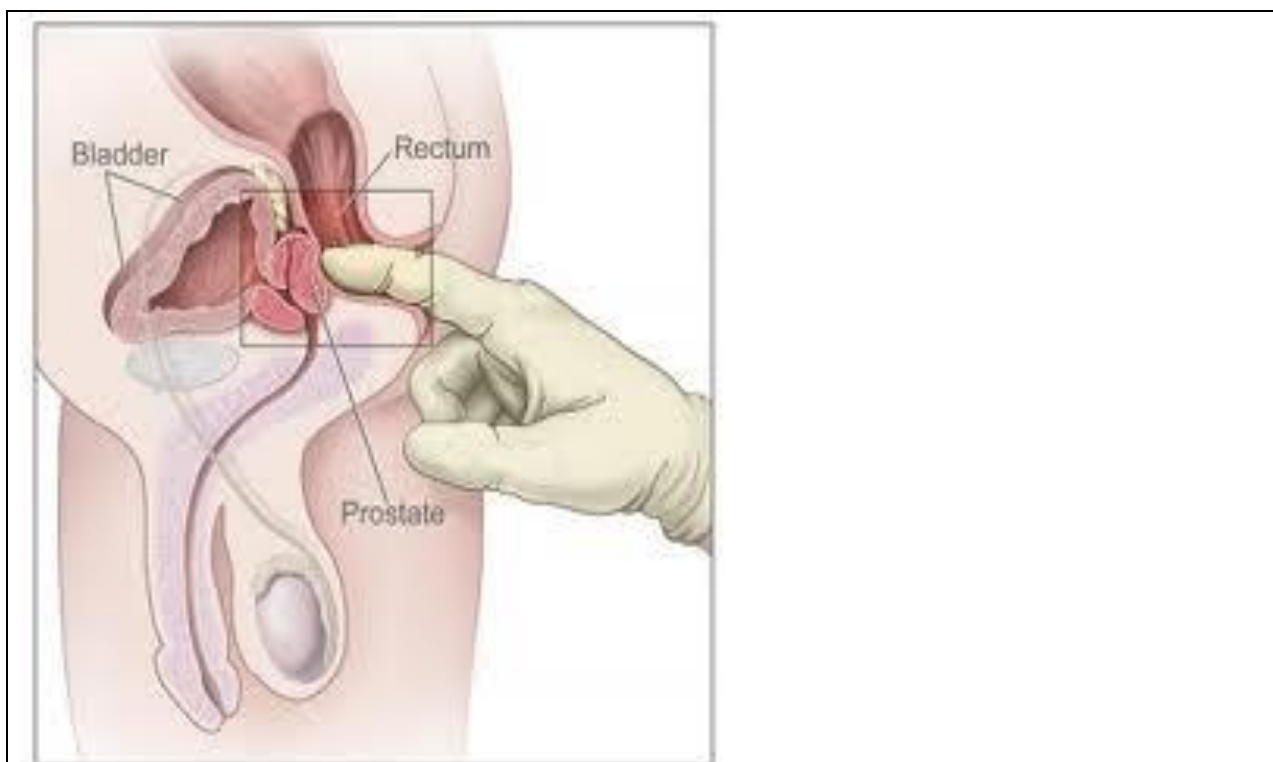


Fig. 2. Technology of digital rectal examination of the prostate.

Prostate massage

After inserting the index finger into the rectum to the level of the base of the prostate (Fig. 2), begin to stroke the right lobe, lightly pressing on it in the direction from the lateral to the medial. Then do the same with the left lobe. In the end, several times press on the gland in the middle in the direction from top to bottom, squeezing the secretion into the urethra.

Examination and palpation of the penis

Pay attention to the condition of the head (whether it is possible to expose or not), the location of the outer opening of the urethra, its diameter and the presence of secretions or pathological formations, size, shape (curvature) of the penis. The penis is palpated without and with a metal dilator inserted into the urethral lumen. On palpation, you can find dense lamellar areas that are painless (Peyronie's disease).

Examination and palpation of the scrotum and its organs

This procedure is performed in vertical and horizontal position. Pay attention to the presence of testicles in the scrotum, the degree of their development, the condition of the testicular appendages, the increase in the size of the scrotum, the condition of the veins of the vine plexus. Determine the size, consistency, soreness of the testicles and their appendages. If one or both testicles are absent in the scrotum, they should be palpated along the inguinal canal, on the inner surface of the thighs, on the perineum or above the pubic bone. Palpation of the testicles is performed bimanually and compares the data obtained by palpation of the left and right testicles. Examination of the external genitalia in boys allows to diagnose diseases and developmental abnormalities, such as: balanoposthitis, phimosis, paraphimosis, short bridle of the anterior skin, hypospadias, epispadias, hydrocephalus, varicocele, cryptorchidism and more.

MATERIALS FOR SELF-CONTROL

Complete the answer

1. The anterior surface of the right kidney is in contact with:
 1. - The liver.
 2. -
 3. -

2. There are the following methods of palpation of the kidneys:
 1. - By Botkin.
 2. - By Guyon.
 3. - In a supine position.
 4. -
 5. -
 6. -

3. Finger rectal examination of the prostate can be performed in the position of the patient:
 1. - On the back.
 2. -
 3. -

4. There are the following phases of erection:
 1. - Calm.
 2. - Swelling.
 3. -
 4. -

5. In the male urethra anatomically distinguish the following parts:

1. - Prostatic.
 2. -
 3. -
6. The kidneys have the following types of mobility:
1. - Static.
 2. -
 3. -
7. The main factors fixation of the kidney in the lumbar region of the retroperitoneal space are:
1. - Fat capsule of the kidney.
 2. -
 3. -

Test tasks

1. At what amount of urine is normal, there is an urge to urinate?
 - A. 100 ml.
 - B. 200 ml.
 - C. 300 ml.
 - D. 400 ml.
 - E. 500 ml.
2. The doctor performed palpation of the kidneys in the standing position of the patient, with the patient leaning forward and his arms placed along the torso. What was the method of palpation of the kidneys?
 - A. By the method of Glenar.
 - B. According to the method of Petit.
 - C. By the method of Guyon.
 - D. By the method of Botkin.
 - E. According to the method of Israel.
3. During the operation on the pelvis of the woman there was a need for ligation of the ovarian artery. Which of the formations can be accidentally tied together with it?
 - A. Ureter.
 - B. Uterine tube.
 - C. Internal iliac vein.
 - D. The urethra.
 - E. Round star'uterine ligament.
4. A patient with a stab wound to the left lumbar region was admitted to the ambulance clinic. During the operation, the surgeon found that the internal organs were undamaged, but the blade of the knife damaged one of the muscles of the renal bed. Name this muscle:
 - A. Internal oblique muscle of the abdomen.
 - B. External oblique muscle of the abdomen.
 - C. Large lumbar muscle.
 - D. Spine straightener.
 - E. Iliac muscle.
5. The kidneys are placed:

- A. In the upper floor of the abdominal cavity.
 - B. Retroperitoneal.
 - C. In the middle floor of the abdominal cavity.
 - D. In the small pelvis.
 - E. In the lateral canals of the abdominal cavity.
6. The shadow of the twelfth rib crosses the right kidney at the level of:
- A. Kidney gate.
 - B. At the lower pole.
 - C. The boundaries of the middle and lower third of the kidney.
 - D. At the upper pole.
 - E. The boundaries of the upper and middle third of the kidney.
7. The shadow of the twelfth rib crosses the left kidney at the level of:
- A. Kidney gate.
 - B. The boundaries of the upper and middle third of the kidney.
 - C. The boundaries of the middle and lower third of the kidney.
 - D. At the upper pole.
 - E. At the lower pole.
8. Which part of the left kidney is turned to the gate of the spleen?
- A. Anterior lip of the left kidney.
 - B. The lower pole of the left kidney.
 - C. Gate of the left kidney.
 - D. The upper pole of the left kidney.
 - E. Posterior lip of the left kidney.
9. The upper-lower size of the normal prostate gland is:
- A. Not more than 1.0 cm
 - B. Not more than 2.5 cm
 - C. Not more than 4.5 cm
 - D. Not more than 1.5 cm.
 - E. Not more than 3.5 cm
10. In the normal prostate gland (according to the site anatomy) are:
- A. Two glandular areas.
 - B. Three glandular areas.
 - C. One glandular area, which consists of the prostate's own glands.
 - D. Five glandular areas.
 - E. Four glandular areas.
11. (According to the site anatomy) in the normal prostate gland are:
- A. Two fibromuscular areas.
 - B. Three fibromuscular areas.
 - C. Four fibromuscular areas.
 - D. Five fibromuscular areas.
 - E. One fibromuscular area.
12. Own glands of the prostate are located:
- A. In the transition area.
 - B. In the peripheral area.
 - C. In the central area.

- D. In the prostatic urethra.
 - E. In the area of the surgical capsule.
13. Node in benign prostatic hyperplasia in rectal finger examination:
- A. Cartilaginous density.
 - B. Density-elastic consistency.
 - C. Stony density.
 - D. Tree density.
 - E. "Dilapidated" consistency.
14. Surgical capsule of the prostate gland is:
- A. Capsule of the prostate gland.
 - B. The space between the central and peripheral area.
 - C. Periprostatic capsule.
 - D. The space between the side particles.
 - E. Capsule between the outer and inner parts of the gland.
15. Cancer node in rectal finger examination:
- A. Cartilaginous density.
 - B. Density-elastic consistency.
 - C. Stony density.
 - D. Soft consistency.
 - E. "Dilapidated" consistency.
16. During pyelography, the doctor found a renal pelvis, which directly flowed into small cups (large ones were absent). What shape of the urinary tract of the kidney did the doctor find?
- A. Embryonic.
 - B. Fetal.
 - C. Tree-like.
 - D. Mature.
 - E. Ampullary.
17. During puberty, the cells of the male gonads begin to produce male sex hormone. testosterone, which causes the appearance of secondary sexual characteristics. Which male gonadal cells produce this hormone?
- A. Supporting cells.
 - B. Sperm.
 - C. Sustentocytes.
 - D. Leydig cells.
 - E. Sertoli cells.
18. The doctor performed palpation of the kidneys in the position of the patient lying on his back, while the doctor did not move to the opposite side of the patient, and pushed his hand under the lumbar region of the opposite side and moved the front hand to the opposite hypochondrium. What was the method of palpation of the kidneys?
- A. According to the method of Israel.
 - B. By the method of Botkin.
 - C. By the method of Guyon.
 - D. In the supine position.
 - E. According to the method of Petit.

Answers to tests:

- | | | |
|---------|-------|----------|
| 1. B, C | 7. A | 13. C |
| 2. D | 8. D | 14. E |
| 3. A | 9. C | 15. A, C |
| 4. C | 10. E | 16. A |
| 5. C | 11. C | 17. D |
| 6. E | 12. C | 18. E |

Recommended Books

I. Main:

1. **Urology:** textbook for students of higher medical educational institutions / [S. P. Pasiechnikov, S. O. Vozianov, V. M. Lesovoy et al.]; ed. by S. P. Pasechnikov. – 2nd ed. – Vinnytsia: Nova Knyha, 2019. – 400 p.
2. **Urology (Practical skills):** study guide / Stus V.P., Lyulko A.V. , Moiseyenko N.N., Fridberg A.M., Polion M.Y., Suvaryan A.L., Barannik K.S.; under edition of V.P. Stus. – Dnepropetrovsk: LLC «Akcent», 2014. – 141 p. <https://repo.dma.dp.ua/5712/>
3. **Basic Clinical Urology. History Taking and Physical Examination /** A.A. Shaaban. – Egypt, 2015. – 177p.
https://www.academia.edu/41359384/Basic_Clinical_Urology_History_Taking_and_Physical_Examination_Edited_by

Methodical development of a practical lesson on the topic 2:

SEMIOTICS OF UROLOGICAL DISEASES

Actuality of theme:

The main symptoms of urological diseases can be local and general. Knowledge of local symptoms and the ability to detect them in diseases of the urinary and male reproductive systems is an important part of becoming a future doctor.

The purpose of the lesson:

To acquaint students with the methods of examination of urological patients.

Theoretically, students should know:

1. Lumbar pain. Their general characteristics, etiology, localization, irradiation.
2. Disorders of urination. Definition, etiology, pathogenesis.
3. Methods of examination of the urinary and male reproductive system.
4. Quantitative and qualitative changes in urine.
5. Renal colic. Etiology and pathogenesis of pain in diseases of the bladder, prostate and external genitalia.
6. Types of anuria; prerenal, renal, postrenal, their causes.
7. Methods of quantitative assessment of leukocyturia by Addis-Kakovsky, Amburge, Nechiporenko.
8. Assessment of renal function. Samples for dissolution and concentration. Sample by Zymnysky. Determination of nitrogenous slag content in the blood.

Practically students should be able to:

1. Collect a history of a urological patient.
2. Determine residual urine (methods).
3. To give interpretation to analyzes of urine, blood, spermogram.
4. Perform provocative tests.

Program issues in student preparation:

1. Describe the pain syndrome in diseases of the urinary and male genital systems.
2. Describe urination disorders.
3. Polyuria, pollakiuria, nocturia.
4. Urinary incontinence, its types.
5. Acute and chronic urinary retention.
6. Paradoxical ischuria.
7. Oliguria. Anuria.
8. Describe the qualitative changes in urine.
9. Hematuria, its types, causes.
10. Pyuria. Bacteriuria, its types.
11. Pneumaturia. Hiluria, its types.
12. Urethrorrhagia, its causes.
13. Name the pathological changes in sperm.
14. How are functional kidney tests performed?
15. What is urinary syndrome?
16. What is nephrotic syndrome?
17. Detection of atypical cells in urine and its diagnostic value.
18. What are the main signs of renal colic?

CONTENTS OF THE TOPIC

Azoospermia - absence of spermatozoa in the ejaculate in the presence of other cells of spermatogenesis.

Anuria- no urine output per day. Cessation of urinary function of the kidneys. Daily diuresis is less than 50 ml (5% of normal). In chronic kidney disease, anuria is not observed. There are prerenal, renal and postrenal anuria. Prerenal is caused by dehydration, various shocks: septic, posttransfusion, traumatic, hypovolemic. Renal anuria is a consequence of the action of nephrotoxic substances (ethylene glycol, heavy metal salts, inorganic mercury compounds, antibiotics, sulfonamides), conditions that are accompanied by hemolysis and myolysis. Postrenal anuria is caused by obstruction of the ureter by stone, retroperitoneal fibrosis, compression or germination of the ureters by malignant tumors, iatrogenic causes (ligation of the ureters during obstetric and gynecological operations, etc.), due to irradiation of the pelvic organs.

Aspermatism - the absence of ejaculate during sexual intercourse while maintaining sexual desire and potency.

Aspermia - absence of spermatozoa and other forms of less mature cells in the ejaculate.

Asthenozoospermia - pathological condition in which more than 50% of sperm are characterized by pathological motility.

Bacteriuria - the presence of a large number of bacteria in the urine.

Galacturia - the presence of galactose in the urine.

Hematuria- the presence of blood in the urine (urine with blood). There are: macrohematuria (visible to the naked eye of varying intensity red in the urine, sometimes with blood clots) and microhematuria (or erythrocyturia, which is detected during microscopic examination of urine sediment). In addition, according to the results of the three-glass test, by origin, there are: initial, terminal and total macrohematuria. In the presence of macrohematuria, it is first necessary to exclude malignant tumors of the genitourinary system.

Hemospermia - the presence of erythrocytes in the ejaculate.

Hydatiduria - the appearance in the urine of small bubbles of echinococcus, which enter the urinary tract from the hydatid bladder in the kidney.

Hyperazotemia - increased content of nitrogenous slag in the blood.

Hyperstenuria- increasing the relative density of urine to 1,030 and above. Observed in diabetes mellitus. It can be physiological when the volume of daily fluid intake is limited and during the hot period of time when fluid loss occurs in other ways.

Hypostenuria- decrease in relative density of urine to 1,005 and below. Observed in diabetes insipidus, chronic bilateral kidney disease. May be physiological when consuming an excessive amount of daily fluid intake.

Acute urinary retention- sudden complete cessation of urine from the urethra with a large accumulation of urine in the bladder and the presence of painful urge to urinate. With acute urinary retention, the time when it occurred, the cause (reflex, diseases and injuries of the spinal cord, prostate tumor, urethral stricture, infravesical obstruction).

Diuresis - the amount of urine that is excreted from the body over a period of time. The definition of daily diuresis is most often used.

Dysuria- urination disorders. Difficult, painful urination. A general term for any urination disorder.

Residual urine- urine that remains in the bladder after the act of urination. Normally it should be no more than 30-40 ml. The main reasons for the formation of residual urine are the presence of obstacles to the excretion of urine from the bladder, which is most often observed in men and is due to the anatomical features of the prostatic urethra. The most common pathological conditions in men that lead to the formation of residual urine are: benign prostatic hyperplasia, prostate cancer, urethral stricture, urethral trauma, acute prostatitis (these pathological conditions with progression lead to acute urinary retention).

Zymnysky test - a method for determining the ability of the kidneys to osmotic concentration and osmotic dilution, based on determining the amount and proportion of urine

excreted every 3 hours during the day in a normal water-diet.

Enuresis - nocturnal incontinence.

Erectile dysfunction (impotence) - the inability of a man to have sexual intercourse due to lack of erection.

Erythrocyturia - the presence of erythrocytes in the urine during its microscopic examination.

Isohypostenuria - monotonous decrease in the relative density of urine. Indicates severe renal failure (renal tubular dysfunction).

Isostenuria - monotonous relative density of urine. One of the signs of chronic kidney disease is when the tubular epithelium of the nephron has lost its concentration function.

Imperative (mandatory) urges - urge to urinate, which are so strong that patients can not restrain them.

Ishuria - Delay of urine (urination) as a result of accumulation of urine in the bladder and the inability to drain. There are: incomplete ischuria (i. Incomplete) - which is characterized by the possibility of urine excretion, but complete release of the bladder from the urine does not occur; acute ischuria (i. acuta) - urinary retention that occurred acutely; paradoxical ischuria (i. paradoxa) - acute incomplete ischuria which is characterized by continuous excretion of urine in drops from an overfilled bladder; complete ischuria (i. completa) - ischuria in which urine is not excreted from the bladder; Chronic ischuria (i. chronica) - ischuria, which is caused by a steady narrowing of the urethra or atony of the bladder.

Clearance test - a test that characterizes the degree of blood purification by the kidneys.

Creatinine - creatine anhydride, which is formed in the body as a result of detachment of the phosphoric acid residue from creatine phosphate; one of the end products of nitrogen metabolism; a constant component of urine.

Leukocyturia - the presence of an increased number of leukocytes in the urine during its microscopic examination.

Necropermia - secretion of only non-viable (immobile) spermatozoa with sperm.

Enuresis - involuntary leakage of urine in which there is no urge to urinate.

Urinary incontinence is real - urine is not retained due to insufficiency of the bladder sphincter, the anatomical integrity of the urinary tract is not violated.

Urinary incontinence is false - leakage of urine due to congenital or acquired defects (defects) of the urinary tract.

Night incontinence (enuresis) - excretion of urine at night during sleep in the absence of organic changes in the genitourinary and nervous systems.

Urinary incontinence - complete loss of the ability to hold urine, when urine is involuntarily excreted when there is an urge to urinate.

Nocturia- frequent nocturnal urination during which more urine is excreted than during the day. Observed in heart failure.

Renal colic - Sudden sharp pain in the kidney or along the ureter, which has a certain irradiation, paroxysmal nature and is accompanied by urinary and digestive disorders.

Pain occurs suddenly, sometimes there is a relationship with exercise (jumping, shaking riding, etc.). The pain is intense, sharp, stabbing, unbearable, which causes restless behavior of the patient. The patient does not find a place, constantly changes the position of the body. Localized pain in the lumbar region, sometimes simultaneously in the abdomen. Irradiate to the waist, hypochondrium, lower abdomen, navel, anterior-inner thigh, suprapubic area, scrotum, glans penis, labia.

When collecting a history of a patient with an acute attack of renal colic, it is necessary to determine:

1. Where did the pain begin (in the lumbar region or in the abdomen)?
2. How did the pain occur (suddenly or slowly)?
3. Localization and nature of pain.
4. Irradiation of pain.

5. Accompanying pain (frequent urination, nausea, vomiting, fever).

Oxaluria - high concentration of oxalates in urine.

Oligakiuria - urination, which occurs very rarely.

Oligozoospermia - reduction of the number of spermatozoa in the ejaculate (up to 60 million in 1 ml) with constant volume.

Oligospermia - Insufficient ejaculate volume.

Oliguria- reducing the amount of urine excreted by the kidneys to 500 ml per day. Occurs with decreased renal blood flow, chronic kidney disease, partial obstruction of the ureters, a combination of these causes. If the systolic blood pressure is less than 80 mm Hg, oliguria or anuria develops. Oliguria can occur in conditions that lead to loss of fluid outside the kidneys (diarrhea, vomiting, sweating).

Opsuria - delayed, late excretion of large amounts of urine (a day or more) after excessive fluid intake.

Pyospermia - the presence of pus in the ejaculate.

Pyuria - the presence of pus in the urine.

Pneumaturia - excretion of air or gas in the urine.

Pollakiuria- frequent urination in which a small amount of urine is excreted. Daytime pollakiuria is characteristic of bladder stone, nocturnal - for the initial manifestations of benign prostatic hyperplasia, permanent - for organic diseases of the bladder (cystitis, tumor, etc.).

Polyuria - excretion of much more urine than normal, during each urination and in general per day (more than 2 liters).

Priapism - pathological prolonged erection of the penis.

Prostatorrhea - secretion of the prostate gland (adhesive fluid) from the outer opening of the urethra at the end of the act of urination or defecation.

Proteinuria- the presence of protein in the urine. False proteinuria can be observed in macrohematuria, pyuria (pyelonephritis). True proteinuria is caused by pathology of the glomeruli (acute and chronic glomerulonephritis).

Acute swollen scrotum syndrome- very painful enlarged and tense testicles and its appendage are palpated. The skin of the scrotum is hyperemic and swollen. This term includes all acute wicket diseases / injuries.

Lower urinary tract syndrome (LUTS) is a generalized common term in clinical practice that characterizes urinary incontinence in men with urological symptoms and consists of two groups of symptoms: obstructive (delayed, irregular, intermittent urination, urinary excretion at the end of urination) and urination during the day, nocturia, imperative calls, urinary incontinence.

Chronic Pelvic Pain Syndrome (CPPS)- the presence of pain in men with chronic prostatitis and no signs of inflammation. The syndrome is characterized by constant, depressing, debilitating pain in the perineum, pelvis, genitals, sometimes the pain is oppressive, shooting, aching. Chronic pelvic pain may be accompanied by sexual desire disorders (libido), erections, and problems with urination. Chronic pelvic pain suppresses the patient's psycho-emotional state, dramatically reduces the quality of life of the patient. Men with CPPS are irritated, depressed, aggressive.

Spermatorrhea - secretion of sperm outside of sexual intercourse without erection and ejaculatory impulses.

Spermaturia - the presence of sperm elements (spermatozoa, spermatogenesis cells) in the urine sediment.

Stranguria - frequent and painful urination.

Teratospermia - pathological condition in which more than 50% of sperm are characterized by pathological morphology.

Uraturia - high concentration of uric acid salts in urine.

Uremia - intoxication caused by an increase in the content of protein metabolism in the blood.

Urethrorrhagia - discharge of blood from the urethra in the absence of the act of urination. Observed in injuries and tumors of the urethra.

Uricuria - persistent presence of uric acid in the urine.

Urinary syndrome: minor proteinuria (up to 3.5 g per day) and (or) erythrocyturia, leukocyturia, cylindruria.

Nephrotic syndrome: tissue swelling, severe proteinuria (more than 3.5 g per day), hypoproteinemia (60 g / l), dysproteinemia (albumin-globulin index below 1), hyperlipidemia.

Local manifestations diseases of the urinary and male reproductive system can be grouped into 4 main urological symptoms:

1. Pain with characteristic localization and irradiation.
2. Disorders of urination.
3. Quantitative and qualitative changes in urine.
4. Pathological discharge from the urethra and changes in sperm.

Three-glass test, methods of conducting:

The patient collects urine at the beginning of the act of urination in the first glass (enough 30 ml), the middle portion - in the second, and the last - in the third glass.

If (turbidity) leukocytes (bacteria) are contained in the first glass - this indicates the presence of an inflammatory process in the urethra. If in the second - the inflammatory process is localized in the bladder, ureters or kidneys. If in the third - inflammation (lesion) of the prostatic urethra or bladder neck.

In the case of hematuria, a three-glass test is also performed, which allows to establish the type of hematuria - initial, terminal, total. If hematuria is initial (first glass), then the blood in the urine will be at the beginning of the act of urination (the source may be: urethral tumor, urethral injury, urethral foreign body). If hematuria is total (all glasses, or the second and third) - this indicates damage to the bladder, kidneys (the source may be: tumors of the bladder, ureters, kidneys, kidney stones, tuberculosis of the kidneys, etc.). In the case of terminal hematuria (third cup), the source of bleeding is the prostatic urethra or bladder neck.

Methods of quantitative assessment of leukocyturia

Nechiporenko's test is the most common method of quantitative analysis of erythrocytes and leukocytes in 1 ml of urine. Examine the sediment of normally collected urine. For the study, after a thorough toilet of the external genitalia, take a medium portion of urine to avoid leukocytes and erythrocytes from the urethra and genitals. In a healthy person, 1 ml of urine contains no more than 1000 erythrocytes, no more than 2000 leukocytes, no more than 20 cylinders.

Kakovsky's – Addis test. Urine is collected for 10 hours, then the collected urine is mixed and collected 1/5 for research. The upper limit of normal in the daily urine is for erythrocytes 1×10^6 , for leukocytes 2×10^6 , for cylinders 2×10^4 .

Amburger test. Get the ratio of erythrocytes and leukocytes, which are excreted by the kidneys in the urine for 1 min, while collecting urine for 3 hours. In a healthy person, up to 1,000 erythrocytes and up to 2,000 leukocytes are excreted in the minute volume of urine.

Provocative tests

Prednisolone test. Intravenously administered 10-15 mg (up to 30 mg) of prednisolone diluted with 10 ml of isotonic sodium chloride solution. After that, the average portion of urine is collected three times at hourly intervals as in the Nechiporenko test. The fourth time urine is collected 24 hours after administration of prednisolone. The number of leukocytes and erythrocytes in each urine sample is determined by the Nechiporenko method (in 1 ml). The test is considered positive in the case of an increase in leukocyturia to 400,000 in 1 hour or three

times compared to this indicator before the introduction of prednisolone (with an hourly excretion of up to 400,000).

Samples for dissolution and concentration

Dissolution test (water test). The patient on an empty stomach for 30-40 minutes drinks 1.5 liters of water or tea. Then collect urine every 30 minutes for 4 hours. Measure the number and relative density of each portions, summarize the total amount of urine for the entire period. If renal function is not impaired, as much (or almost as much) urine is excreted in 4 hours as fluid was drunk, mainly within 2 hours. The relative density of urine in individual portions is reduced to 1001-1003.

Concentration test (with dry food) is carried out similarly to Zymnytsky's test. Urine is collected every 3 hours during the day, but in the absence of fluid and liquid food intake. The diet consists of dry bread, fried meat, eggs. In this mode, the relative density of urine normally increases to 1030-1032.

Both tests are used in the absence of contraindications from the circulatory system.

Zymnytsky's test. During the day, urine is collected in separate 3-hour portions (8 cans, 4 of which per day and 4 per night). The obligatory moment is registration of quantity of the consumed liquid for the investigated period of time. Day diuresis (1-4 jars) and night (5-8 jars), as well as daily diuresis are calculated. The relative density is determined in each portion. In healthy people during the day excreted in the urine 2 / 3-4 / 5 (65-80%) of fluid intake. Daytime diuresis should be almost 2 times higher than nighttime. The difference between the fluctuations of the relative density must be at least 0012-0016.

Detection of atypical cells in urine

Examine fresh urine, wash water, aspiration fluid, daily urine. It is best to use the technique of alcohol rinsing of the bladder mucosa, followed by a study of the obtained rinse. Urine centrifuges are used to prepare smears on slides, which are stained according to the Papenheim method.

MATERIALS FOR SELF-CONTROL

Complete the answer

1. There are the following quantitative changes in urine:
 1. - Polyuria.
 2. -
 3. -

2. Hematuria is:
 1. - Total.
 2. -
 3. -

3. There are the following pathological secretions from the urethra:
 1. - Purulent.
 2. - Prostatorrhoea.
 3. -
 4. -

4. Impaired concentration of kidney function is manifested in the form of:
 1. - Hypostenuria.
 2. -
 3. -

5. Pathological changes in sperm are manifested in the form of:
 1. - Necropermia.
 2. - Oligospermia.
 3. - Pyospermia.
 4. -
 5. -

6. For the quantitative analysis of cellular elements of urine methods are used:
 1. - Nechiporenko.
 2. -
 3. -

7. Urinary syndrome is manifested:
 1. - Leukocyturia.
 2. - Erythrocyturia.
 3. -
 4. -

Test tasks

1. The patient complained of frequent urination with small portions of urine. During the examination it was found that the daily diuresis does not exceed the norm. What is the name of this urination disorder?
 - A. Nocturia.
 - B. Oliguria.
 - C. Polyuria.
 - D. Pollakiuria.
 - E. Stranguria.

2. The patient complained of involuntary urination during the urge to urinate. After examination, she was diagnosed with acute cystitis. No abnormalities in the development of the genitourinary system were detected. This condition in the patient should be classified as:
 - A. Paradoxical.
 - B. Stranguria.
 - C. True urinary incontinence.
 - D. False urinary incontinence.
 - E. Urinary incontinence.

3. Oliguria is a condition when the amount of urine excreted by the kidneys per day is up to:
 - A. 50 ml.
 - B. 100 ml.
 - C. 500 ml.
 - D. 1000 ml.
 - E. 1500 ml.

4. At what pathological processes there can be an urethrorrhagia?
 - A. With injuries of the urethra.
 - B. With kidney injuries.
 - C. In tumors of the bladder.
 - D. In tumors of the urethra.
 - E. In prostate tumors.

5. The patient is 27 years old, complains of a transparent discharge of sticky consistency at the end of the act of urination from the outer opening of the urethra. After analyzing the secretions obtained lecithin grains, single leukocytes and erythrocytes. Sperm were not secretly detected. What are such allocations called?
 - A. Spermatorrhea.
 - B. Prostatitis.
 - C. Urethrorrhagia.
 - D. Leukocyturia.
 - E. Oligospermia.

6. The patient complained of pyuria. After performing a three-glass test, the presence of pus was detected only in the first glass. What localization of the pathological process should be considered?
 - A. Kidney.
 - B. Upper urinary tract.
 - C. Urea.
 - D. Prostate.
 - E. Bladder.

7. The patient was diagnosed with total hematuria by a three-glass test. Which organ of the genitourinary system can be a source of blood?
 - A. Urethra.
 - B. The bladder.
 - C. Seed bubbles.
 - D. Prostate.
 - E. Kidney.

8. The patient, 65 years old, for 6 months difficult, sluggish stream of painless urination, periodically has a feeling of incomplete emptying of the bladder. Urination 3-4 times at night. During ultrasound, after urination, 100 ml of urine is determined in the bladder. What is this condition called?
 - A. Chronic ischuria.
 - B. Nocturia.
 - C. Oligakiuria.
 - D. Opsouria.
 - E. Stranguria.

9. The patient went to the hospital with complaints of dysuria, low-grade fever. In the general analysis of urine leukocytes cover all fields of vision. What research would be appropriate to verify the source of leukocyturia?
 - A. Nechiporenko's test.
 - B. Three-glass test.
 - C. Reberg-Tareev test.
 - D. Amburger's test.
 - E. Zymnytsky's test.

10. The patient, 40 years old, complains of constant aching pain over the pubis, urination every 10-15 minutes with severe heartburn at the end of the act of urination. The diagnosis of acute cystitis is confirmed by preliminary examination: leukocytes $11.0 \times 10^9 / l$, ESR - 22 mm / h. Urine analysis: leukocytes in the entire field of view, fresh erythrocytes up to 20 in the field of view. What additional research is needed to clarify the diagnosis and choice of treatment

- tactics?
- A. Cystoscopy.
 - B. Infusion urography.
 - C. Ultrasound.
 - D. Bacteriological examination of urine.
 - E. Computed tomography of the genitourinary tract.
11. A 48-year-old man consulted a urologist at the clinic. It is known that after hypothermia observed blood impurities in the urine without urination disorders. After 12 hours, macrohematuria disappeared. Which of the following recommendations is most appropriate?
- A. Apply for examination during recurrent hematuria.
 - B. Prescribe hemostatic therapy for prevention.
 - C. Perform special studies aimed at determining the source of hematuria - cystoscopy.
 - D. Perform a set of laboratory tests to determine further treatment.
 - E. Consultation with a nephrologist.
12. A young man, 18 years old, was admitted to the admission department with complaints of attacks of pain in the right half of the abdomen with irradiation to the scrotum, nausea, vomiting. Ill acutely for the first time. Palpation reveals muscle tension in the right half of the abdomen. Shchetkin's symptom is doubtful. Pasternatsky's symptom is weakly positive on the right side. Temperature 37.7 ° C. Number leukocytes $8,0 \times 10^9 / l$. In the analysis of urine 3-5 erythrocytes in the field of view. Which of the following diagnoses is most likely?
- A. Renal colic.
 - B. Acute appendicitis.
 - C. Acute cholecystitis.
 - D. Intestinal obstruction.
 - E. Perforated ulcer of the duodenum 12.
13. Patient M., 42 years old, was taken to the admission department with a diagnosis of "renal colic". Which of the following symptoms is most likely for the patient?
- A. The presence of sugar in the urine.
 - B. Leukocytosis.
 - C. Decreased levels of erythrocytes and hemoglobin in the blood.
 - D. Bilirubinemia.
 - E. Hematuria.
14. A 38-year-old man, previously healthy, suddenly developed an attack of acute abdominal pain with irradiation to the left lumbar and groin area, accompanied by nausea, sweating and frequent urination. The patient is worried, fussing on the bed. During the examination no pathological changes were detected. What is the most likely diagnosis?
- A. Torsion of the left testicle.
 - B. Left renal colic.
 - C. Diverticulitis of the sigmoid colon.
 - D. Retroperitoneal hemorrhage.
 - E. Herpes zoster.
15. A 10-year-old girl was diagnosed with acute pyelonephritis. What examination should be performed before prescribing antibacterial therapy?
- A. Nechiporenko's test.
 - B. Urine culture and sensitivity to antibiotics.
 - C. Consultation with a gynecologist.
 - D. Blood test.

- E. Ultrasound.
16. A 81-year-old patient complains of constant dripping of urine, a feeling of distension in the lower abdomen. Objectively: above the pubis a spherical protrusion, over which the percussion is determined by blunting, a positive suprapubic impulse. What symptom is observed in the patient?
- A. Paradoxical ischuria.
 - B. Urinary incontinence.
 - C. Polakiuria.
 - D. Dysuria.
 - E. Enuresis.
17. Pain that occurs in the lumbar region during urination is a sign of:
- A. Acute cholecystitis.
 - B. Torsion of the ovarian cyst.
 - C. Bladder-pelvic reflux.
 - D. Radiculopathy.
 - E. Renal colic.
18. A 48-year-old woman complains that she loses urine with any stress - coughing, lifting weights. There are no other urination disorders. What symptom is it?
- A. Urinary incontinence.
 - B. Polakiuria.
 - C. Dysuria.
 - D. Urinary incontinence.
 - E. Stranguria.
19. The patient, 36 years old, was admitted to the clinic with complaints of pain in the right lumbar region, the appearance of blood in the urine after an attack of pain. Earlier in the sediment of urine found brown sand. The kidneys are not palpable. Pasternatsky's symptom on the right is positive. Examination of urine revealed microhematuria, uraturia. What disease can these symptoms indicate?
- A. Urolithiasis.
 - B. Kidney tumor.
 - C. Tumor of the bladder.
 - D. Cystitis.
 - E. Kidney injury.
20. A patient, 18 years old, unmarried, suddenly had pain in the left lumbar region. Body temperature is normal. There is nausea, vomiting. Urination is not disturbed. During bimanual palpation, the pain on the left increases (palpation of the kidney on the right is painless). The kidneys are not palpable. What disease should you think about?
- A. Acute pyelonephritis.
 - B. Acute cholecystitis.
 - C. Kidney colic.
 - D. Sciatica.
 - E. Pneumonia.
21. Patient, 34 years old. Complains of acute pain in the perineum, giving in the sacrum, suprapubic area. Body temperature 38.3 C. I fell ill 2 days ago, when at the same time with the pain there was difficulty urinating. There was an acute urinary retention this morning. What is the previous diagnosis?

- A. Trauma of the urethra.
 B. Acute urethritis.
 C. Acute cystitis.
 D. Acute prostatitis.
 E. Acute pyelonephritis.
22. The mother complains that a 5-year-old child urinates during sleep. Objectively and in the study of urine pathological changes were not detected. What is the disorder of urination in a child?
 A. Nocturia.
 B. Nocturnal pollakiuria.
 C. Enuresis.
 D. Dysuria.
 E. Urinary incontinence.
23. Patient of 23 years with dysuria, turbidity of the first portion of urine owing to impurity of leukocytes and bacteria is expressed. What is the previous diagnosis?
 A. Acute prostatitis.
 B. Acute urethritis.
 C. Acute cystitis.
 D. Acute pyelonephritis.
 E. Prostate abscess.
24. Quantitative changes in urine include:
 A. Hematuria.
 B. Pyuria.
 C. Stranguria.
 D. Hemoglobinuria.
 E. Oliguria.

Answers to tests:

1. D	7. B, E	13. E	19. A
2. E	8. A	14. C	20. C
3. C	9. C	15. C	21. D
4. A, D	10. D	16. A	22. C
5. C	11. C	17. C	23. C
6. C	12. A	18. D	24. E

Situational tasks

Task №1

The patient, 23 years old, developed cloudy urine due to an admixture of leukocytes and bacteria, but the localization of the inflammatory process is unknown.

What simple technique should be used to determine the location of the inflammatory process?

Task №2

Patient, 23 years old, married for 6 weeks. She did not live a sexual life before marriage. Complains of frequent painful urination with imperative urges. I fell ill 4 days ago. Before the disease, urination was 1-2 times a day, but since the disease, urination has become very frequent, and 2 days ago - painful. When you felt the need to urinate, a very small amount of urine was excreted. Last night's pain became too strong, and this morning noticed a small

amount of blood on the toilet paper after urination. He does not remember whether he empties his bladder after sexual intercourse. Objectively there is pain on deep palpation in the suprapubic area. There are no signs of bladder enlargement with percussion. Urine analysis: dark yellow color, pH - 6.0, specific gravity 1029, erythrocytes 60-80, leukocytes 40-50 in the large field of view.

What diagnosis can be made on the basis of these symptoms? With what is related the occurrence of the disease? What are the ways to prevent it in this particular case?

Task №3

The patient is 74 years old. Within 2 years notes the worsened urination, it is necessary to make physical efforts of abdominal pressure, the flow of urine is sluggish, often interrupted. On admission notes urinary incontinence, constant stabbing pain over the pubis, where you can see the protrusion, the upper edge of which is placed on navel levels. Percussion in this area there is dullness. Urine is constantly excreted in drops for several days.

What kind of urination disorder does the patient have? What disease should you think about and why?

Task №4

The patient is 28 years old. Two years ago I had salpingo-oophoritis. Since then, notes periodic (spring and autumn) frequent, sometimes painful urination, mainly during the day, pain in the suprapubic area. At night, the urge to urinate does not bother. Examined by a gynecologist - pathology from the sidefemale genitals were not detected. Repeated urine tests - without pathological elements.

What disease do you need to think about? What is the reason for its occurrence?

Task №5

The patient, 29 years old, was admitted to the clinic with complaints of paroxysmal pain in right lumbar region, blood in the urine after an attack of pain. Earlier in the urine sediment found brown grains. The kidneys are not palpable. Pasternatsky's symptom is positive. Examination of urine revealed microhematuria, uraturia.

What disease can these symptoms indicate?

Task №6

A 48-year-old woman complains that she loses urine with anyone tension - coughing, weight lifting. He no longer notes any manifestations of urination disorders.

What symptom should you think about?

Task №7

The patient has complaints and clinical signs that indicate the possibility of localization of inflammatory process in the kidneys or urinary tract, but the usual examination of urine sediment does not provide sufficient grounds to confirm the diagnosis.

What laboratory methods should be used in such a situation to detect latent leukocyturia?

Task №8

The patient complains of intense pain in the left lumbar region, chills, accompanied by a rise in body temperature to 38 C. General urine analysis: relative density - 1035, acid reaction, turbid urine, leukocytes cover the entire field of view, erythrocytes - 10 in the field of view, sugar is not detected, protein 0.066 g / l, single squamous epithelium in the field of view, bacteria ++ (two plus).

What disease can be thought of according to the received analysis of urine?

Task №9

A patient who complains of aching pain in the right lumbar region performed a study of urine by the method of Nechiporenko. In 1 ml of urine were found: erythrocytes - 1200, leukocytes - 12000 (among which 20% - active, and 15% - Sternheimer-Malbin cells), cylinders - 28.

What disease can be thought of according to the received analysis of urine?

Task №10

The patient underwent a urine test by Zymnitsky. The study began at 6 o'clock in the morning. During the test, the patient drank 2 liters of fluid.

Time	The amount of urine, ml	Relative density of urine
6-9	35	1009
9-12	45	1011
12-15	40	1008
15-18	50	1009
Daytime diuresis	170	
18-21	50	1012
21-24	95	1008
0-3	70	1010
3-6	80	1009
Nocturnal diuresis	295	

What do the following urine test results show?

Task №11

The patient underwent microbiological examination of urine. The microbial count of urine is 1×10^6 in 1 ml of urine. Sowing result: E.coli. Results of determination of sensitivity to antibiotics: ofloxacin (+), erythromycin (resistant), chloramphenicol (+ + +), polymyxin (+ +), furazolidone (resistant).

What do the results of the analysis show, how do they affect the tactics of treatment?

Task №12

The patient, 23 years old, received biomaterial from the urethra using a universal probe. Data of cytomorphological research: in the cytoplasm of cells of a prismatic epithelium near a kernel inclusions in the form of caps which are presented by elementary bodies are found; the presence of a significant number of polymorphonuclear leukocytes. High index of immunoglobulins A to the pathogen.

What do the results of the analysis indicate?

Answers to situational problems

Task №1

To determine the source of leukocyturia (as well as hematuria) is the simplest and a very informative method of research is the test of three glasses.

Task №2

The patient has acute cystitis. In this case, there is a connection between sexual life and urinary tract infection resulting from the anatomical features of the female reproductive system. Given the cause, it is necessary for prophylactic purposes to recommend urination before and after sexual intercourse. The second cause of the disease can be a very rare emptying of the bladder and therefore there is a need to perform a regime of frequent urination - every 2 hours.

Task №3

The patient has paradoxical ischuria (urinary incontinence with overflow bladder). Given the age, the gradual progression of the disease, one should think of a prostate tumor.

Task №4

The patient has cystalgia. The cause of the disease in this case may be previously suffered from pelvic inflammatory disease.

Task №5

The consistent appearance of pain, hematuria and crystalluria allows, above all, think about urolithiasis, renal colic on the right side.

Task №6

The patient has relative urinary incontinence during physical exertion. In contrast to urinary incontinence, incontinence is not associated with the urge to urinate.

Task №7

Methods for detecting latent leukocyturia are urine tests for Nechiporenko, Kakovsky-Addis, Amburger, or after provocative tests.

Task №8

In the analysis of urine there is an increase in relative density, the appearance of turbidity, severe leukocyturia, the appearance of erythrocytes and protein, severe bacteriuria. This analysis of urine indicates the presence of an acute inflammatory process in the upper urinary tract, in particular - acute pyelonephritis.

Task №9

In the analysis of urine there is a slight increase in the number of erythrocytes and cylinders, and a significant increase (three times) in leukocytes and the appearance of active leukocytes and Sternheimer-Malbin cells. This analysis of urine indicates the presence of a chronic inflammatory process in the upper urinary tract, in particular - chronic pyelonephritis.

Task №10

This analysis of urine shows that the patient has impaired concentration and excretory function of the kidneys, as indicated by a small amount of urine in each portion, the predominance of nocturnal diuresis over day, the volume of diuresis is 25% of fluid intake, low relative density of urine in each portion (hypoisostenuria). This may indicate chronic kidney disease (chronic renal failure).

Task №11

The patient has a high degree of bacteriuria due to the presence E.coli, which indicates an inflammatory process in the urinary system. For adequate treatment it is necessary to prescribe chloramphenicol, as the excitatory drug has the greatest sensitivity.

Task №12

The patient has urethritis of chlamydial etiology, acute phase.

Recommended Books

I. Main:

1. **Urology:** textbook for students of higher medical educational institutions / [S. P. Pasiechnikov, S. O. Vozianov, V. M. Lesovoy et al.]; ed. by S. P. Pasechnikov. – 2nd ed. – Vinnytsia: Nova Knyha, 2019. – 400 p.
2. **Urology (Practical skills):** study guide / Stus V.P., Lyulko A.V. , Moiseyenko N.N., Fridberg A.M., Polion M.Y., Suvaryan A.L., Barannik K.S.; under edition of V.P. Stus. – Dnepropetrovsk: LLC «Akcent», 2014. – 141 p. <https://repo.dma.dp.ua/5712/>
3. Basic Clinical Urology. History Taking and Physical Examination / A.A. Shaaban. – Egypt, 2015. – 177p.
https://www.academia.edu/41359384/Basic_Clinical_Urology_History_Taking_and_Physical_Examination_Edited_by

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