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UROLOGY

(Methodical elaborations of practical classes for students)

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CONTENTS

PREFACE

Today medicine is characterized by impetuous development of new, highly-technological methods of patients' examination and treatment. Modern urology scopes a wide range of problems. It includes conservative urology and surgical treatment of kidney diseases, their vessels, urinary tract, and male genital organs. It is difficult for students, who begin studying urology to be directed toward profound instructions on urology and special literature devoted to separate aspect of the subject. This textbook edition contains the most up-to-date interpretation of methods of diagnostics and treatment of urologic diseases, being the fundamental of mastering these aspects.

Textbook edition is compiled according to the Programme on urology for students of high medical institutions of III and IV levels of accreditation in conditions of credit-module system of study, approved by Central methodical commission on higher medical education of MPH of Ukraine (KYIV, 01.06.2012).

A book is intended for the IV-year students of higher medical institutions and associates as one of the methods of professional training.

Module № 1

Thematic module №1

Theme of the lesson:

Clinical anatomy and physiology of development of urogenital system. Anomalies of development.

Actuality of the theme

Actuality of the theme is caused by the fact that without knowledge of normal structure of urogenital system, its normal functioning, it is impossible to define and correctly interpret changes of its pathology. 10-14% of children are born with various anomalies of organs of urogenital system. Among the patients of urologic profile such patients make up more than 12%, and in child age - 37%. Bearing in mind that defects of development of organs of urogenital system are the most important factors of many urologic diseases, actuality of this theme for the doctors of various profiles is beyond any doubts.

Aim of the lesson:

- To learn symptoms and principles of diagnostics of congenital defects of urogenital system, to define them in early child age and to refer a patient to urologist with the aim of timely correction.

Student must know:

- Anatomical peculiarities of structure of urogenital system organs.
- Classification of anomalies of development of urogenital system.
- Clinical manifestations, diagnostic algorithm, complications, principles of treatment.

Students must be able to:

- Analyze anatomical peculiarities of structure of urogenital system organs (tables, material from text-book).
- To explain mechanism of urination (material of lectures, text-book).
- To interpret clinical anatomy, physiology and methods of investigation of urogenital system organs (material of lectures, text-book).
- To analyze peculiarities of clinical manifestation of anomalies of development or urogenital system organs (patients, materials of the lectures, text-book).

- To define basic anatomic-topographic and clinical aspects of upper urinary tract on the basis of knowledge of anatomy, physiology, histology, pathologic morphology (tables, material of text-book).
- To make plan of examination of a patient suspected to have defects of urogenital system (materials of lectures, text-book).
- To make treatment plan (materials of lectures, text-book).

Practical skills which are to be mastered at practical class:

- Physical examination of kidney (inspection, palpation, Pasternatsky's symptom)
- Physical examination of the urinary bladder (inspection, palpation, percussion)

Interdisciplinary integration

Subjects studied before	Obtained skills
a) Subjects studied before:	
Anatomy	To describe anatomy of urogenital system organs
Physiology	To define function of urogenital system organs
Histology	To know histologic structure of urogenital system
Topographic anatomy	To explain topography of urogenital system
Pathologic anatomy	To analyze pathologic changes of urogenital system
Pathologic physiology	To analyze pathologic changes of urogenital system
Roentgenology and medical radiology	To comment X-ray pictures and scintigrams.

Contents of the lesson

Anatomy

Kidneys – pair organ, located in the upper portion of retroperitoneal area, they are covered with the following membranes: fibrous capsule, perirenal fat, pre- and supra-peritoneal Gerout's fascias.

Nephron is a structural unit of kidney. Structure of the nephron: glolmerular capsule (Shumliansky-Bowman's) and capillary glomerulus. Convoluted and direct canaliculus of the I order proceeds further, Henle's loop, direct and convoluted canaliculus of the II order, which falls into collecting tubule. Collecting tubules fall into renal calices. Vascular net of glomerulus is presented by afferent glomerular arteriole, which disintegrates into capillary net, forming renal glomerulus. Efferent arteriole comes out of glomerulus, also disintegrating into capillary net, which envelops renal tubules.

5 segments are distinguished in each kidney, they are: upper, upper anterior, lower anterior, lower and posterior. Renal hilus, transient into renal sinus is located on the inner surface. Big and small renal calices, renal pelvis, blood and lymphatic vessels, nervous fibers, fatty tissue are located in the renal sinus.

At renal hilus there located renal pedicle with renal pelvis, located posteriorly, pelvis-urinary segment and initial portion of the ureter, a little higher and at the front – renal artery, and further to the front and higher – renal vein.

Posterior surface of the kidney is adjacent to the lumbar portion of the diaphragm, quadrate muscle, lumbar muscle of the abdomen, major lumbar muscle. Pleural costal-diaphragm sinus is located behind upper pole of the kidney. Upward, somewhat medially to the front from upper pole, adrenal gland is located.

Liver, liver portion of the colon, descending part of the duodenum are adjacent to the right kidney in front. From these organs kidney is separated by parietal layer of the abdomen, pre-renal fascia and loose fatty tissue. Spleen, fundus of the stomach, body of pancreas gland, splenic part of colon are adjacent to

the left kidney. Vertebrae are located on the medial sides of the both kidneys. Aorta is located at the front and in the left side from the skeleton, inferior vena cava is in the right side. Renal arteries come off aorta. Lower inferior adrenal arteries come off upward from renal arteries, urethral arteries come off downward. Renal veins fall into inferior vena cava.

Lymphatic vessels form two systems - superficial (in fibrous capsule) and deep (in renal parenchyma). Outflow of lymph from the right kidney goes into lateral-caval, retrocaval and aorta-caval lymphatic glands. Outflow of lymph from the left kidney – into retro-aortal, lateral-aortal, and pre-aortal lymphatic glands.

Renal pelvis is the reservoir into which renal calices are opened. Big and small calices are distinguished. Small calices may be from 4 to 20 in number, more often - 6-8, big ones are 2-4 in number.

Ureter – pair tubular organ, removing urine from kidney into urinary bladder. Wall of ureter is composed of three parts: epithelial, muscular and adventitial.

Ureter has three narrowings: in outlet from renal pelvis, at the site of interlacing with iliac vessels, at the site of falling into urinary bladder. Upper part of ureter is supplied with blood by ureteric branches of renal, and testicular arteries, middle part – by branches of aorta, lower part – by branches of middle rectal and inferior urethral artery. Veins of ureter fall into testicular and internal iliac vein. Lymphatic vessels fall into lumbar and internal iliac lymphatic glands.

Urinary bladder performs reservoir function. Apex, body and fundus is distinguished in the urinary bladder. In the area of the fundus Leutaud’s triangle is located. Wall of the urinary bladder is composed of mucous membrane, sub-mucous layer of connective tissue, three-layered muscular membrane, serous and adventitial layer. Arterial blood flow is carried out from the system of the internal iliac artery. Outflow of venous blood is carried out into venous interlacing of the

urinary bladder and internal iliac veins, that of the lymph - into internal, external iliac, obturative and partially into sacral lymphatic glands.

Innervation of the urinary bladder is performed by inferior sub-peritoneal sympathetic interlacing and pelvic internal parasympathetic nerves.

Physiology

Kidney is a complex organ of urinary system. It provides urination and excretion of metabolic exchange products, preserves acid-base and water-saline balance of the organism, maintains and regulates osmotic and arterial pressure, erythropoiesis, and performs antitoxic function as well.

So, kidney is an important organ, its multiple functions are directed to achieve a single aim – maintaining of homeostasis or continuity of inner environment of the organism.

Extra-renal urinary ways execute transport of urine from the upper portions into lower ones at the expense of their subsequent active dilatation and contractions.

From collecting tubes urine comes into calices by 2 stages: period of filling and period of emptying into renal pelvis. Evacuation of urine from the renal pelvis into urethra occurs by portions.

Activity of the urinary bladder should be considered as accumulation of urine in the urinary bladder, its retaining and evacuation outside through the urethra. The main condition of accumulation of urine in the bladder is closed lumen of internal urethral orifice.

Anomalies of development.

Structural-logical scheme of theme content

Educational elements		
I order	II order	III order
Anomalies of kidneys and ureters		
Classification of anomaly of kidneys	Anomalies of renal vessels	Anomalies of quantity and location. Anomalies of form and structure of renal artery. Congenital arterial-venous fistules. Anomalies of renal veins.
	Anomalies of quantity	Aplasia, renal doubling. Accessory kidney.
	Anomalies of renal size	Hypoplasia. Dwarf kidney. Rudiment kidney.
	Anomalies of location	Thoracic, lumbar, iliac, pelvic, crossed. Rotation of kidney.
	Anomalies of interrelation	Unilateral (L-like), bilateral (symmetric – horse shoe-shaped; asymmetric – S – like kidney
	Anomalies of structure	Dysplasia: simple, cortical, oligomega-nephron, segmentary. Renal cysts: poly-cystosis, multi-cystosis solitary (simple, dermoid), pararenal, pelvic-caliceal.
	Anomalies of renal microstructure	Pelvic-medullar anomalies: turbular dilatation, spongy kidney, mega-calicosis, poly-megacalicosis. Turbolopathy with nephrolithiasis (cystinuria, xantinuria, glicinuria, nephrocalcinosis). Tubulopathy with polyuria: renal glucosuria, nephrogenic diabetes insipidus

	Combination of renal anomalies	Nephritis with loss of salt. Renal tubular acidosis: Lightwood's syndrome, Butler-Albright syndrome with bladder-urethral reflux with intravesicular obstruction, with bladder-urethral obstruction with anomalies of other organs and systems.
Classification of ureter anomalies	Anomalies of quantity	Aplasia, duplication, triplication
	Anomalies of structure	Hypoplasia, narrowing, valve, ureterocele, megalo-ureter, achalasia, uretero-hydronephrosis
	Anomalies of form	Ring-like, spin-like
	Anomalies of localization	Retrocaval, retro-iliac ureter, ectopy of ureter orifice
Clinical picture of obstructive uropathies	Developmental lag. Disuria. Dyspeptic disorders. Changes in urine	Anorexia, nausea, vomiting, pain in the abdomen. Disorders of urination, pain. Urine incontinence. Enuresis. Leukocyturia, erythrocyturia, proteinuria, bacteriuria
Diagnostics	Analysis of pregnancy course of mother. Analysis of psycho-motor development of a child. Complex urologic examination.	Blood analysis and urinalysis. Bacteriologic investigation. Ultrasonic examination.
Treatment	Conservative treatment. Surgical treatment.	Anti-inflammatory, stimulating therapy, exercise therapy, physiotherapy. Corrective, drainage interventions, nephrectomy
Anomalies of urinary bladder	Anomalies of urinary duct. Agenesia of urinary bladder .	Bladder-umbilical fistula. Umbilical fistula. Urachal cyst. Diverticulum of urinary bladder.

Anomalies of urinary ways at the level of cystic-urethral segment	Hypertrophy of inter-ureteric fold. Enlarged cystic triangle (megatriangle). Excessivness of mucous membrane of cystic triangle. Contracture of bladder neck.	Roentgenologic examination.
Anomalies of urethra.	Congenital cyst of urethra. Congenital urethral-rectal fistula. Prolapse of urethral tunica.	
Clinical picture of intravesicular obstruction.	Difficult, rare urination. Urinary retention (acute, chronic). Presence of tumor-like formation over the pubis. Pathologic changes of the urine Hyperthermia.	Palpation and percussion of urinary bladder, catheterization of urinary bladder, interpretation of urinalysis.
URINITAL Avv NOMALIES	Curvature of penis. Splitting of urethra.	Comments on external inspection of genital organs.
Diagnostics	Assessment of urination act. Inspection of penis, urethra. Cystogram (simple, mixed). Urethrocystogram. Excretory urography. Uroflowmetria. Assessment of renal functional state. Instrumental investigation.	Interpreting of the obtained results of investigation.
Treatment	Surgical treatment. Conservative.	Palliative interventions (cystostomia). Reconstructive surgeries. Anti-inflammatory therapy. Stimulating therapy. Exercise therapy. Regimen of forced urinations.
Anomalies of male genital organs		

Anomalies of penis	Absence of penis.Absence of penile balanus. Hidden penis. Penile ectopy. Duplication of penis. Membranous penis. Congenital phimosis. Short penile frenulum.	
Anomalies of testes	Anomalies of quantity. Anomalies of structure. Anomalies of localization. Hydrocele, funicular hydrocele. Cyst of testes and epididymis. Varicocele.	Testicular hypoplasia. Cryptorchidism (inguinal, peritoneal). Ectopia of testis (peritoneal, inguinal, pubic, femoral, perineal, crossed).
Anomalies of prostate gland	Aplasia. Hypoplasia. Atrophy. Ectopia.	Carrying out of manual rectal examination.
Diagnostics.	Inspection, palpation of external genital organs. Manual rectal examination, USI, TRUSI, CT, MRI. Assessment of functional state of kidneys. Laparoscopy.	Interpreting of data obtained

Treatment.	Surgical treatment. Conservative	Corrective surgeries. Minimally-invasive surgeries. Anti-inflammatory therapy. Stimulating therapy. Exercise therapy. Regimen of forced urinations.

Theoretical questions:

1) Anatomical structure of kidney.
2) Structural unit of kidney
3) Topical skeleton of kidney.
4) Topography of kidney.
5) Renal vessels.
6) Topography of ureters.
7) Topography of urinary bladder.
8) Function of kidney.
9) Function of ureters.
10) Function of urinary bladder.
11) Anomalies of kidneys.
12) Anomalies of ureters.
13) Anomalies of urachus.
14) Anomalies of urinary bladder.
15) Anomalies of urethra.

Tasks of the II level:

1. Extrophy of urinary bladder is:

- Absence of its anterior wall and anterior abdominal wall
- Sac-like protrusion of bladder wall

- Stricture of internal urethral orifice

2. In male patient, aged 19 years pain developed in the left iliac-inguinal area. Objectively:

- tumor-like formation, size - 11x7 cm, elastic, moderately tender is palpable. What anomaly of development is it? What is it confirmed by? Is laparotomy without urologic examination justified in this case?

Diagnosis: iliac-sacral dystopia of the left kidney. Excretory urography, USI is not justified.

3. Male patient, aged 32 years complains of elevation of arterial pressure, weakness.

Objectively: in both epigastric areas painless humpbacked tightly-elastic formations are palpable. On laboratory investigation: signs of chronic renal insufficiency, anemia. What is initial diagnosis? How is to be confirmed? Against what disease differential diagnosis should be carried out?

Diagnosis: polycystic renal disease. USI, plain urography, CT. Against tumors, multiple renal cysts.

Structure of the lesson

Succession of actions	Oriented fundamentals of actions	Self-control
Complaints and anamnesis	Localization and character of pain, presence of symptoms of lower urinary ways, time of onset of first signs of disease, their further development, presence of urinary system diseases in family history, if disorders of alimentary tract, thirst, dryness in the mouth, elevation of arterial pressure, elevation of temperature, fever were present	
Objective examination	To assess state of patient's severity (pulse, BP, respiratory rate), state of integuments. On inspection of abdomen to assess symmetry, if protrusion is present. To inspect external genital organs: presence of anomalies. To perform abdominal palpation of patient, lying on his back, side, while eating, in presence of palpable formations – to assess their sizes, consistency, tenderness, mobility. To perform percussion over formation, to define presence of tympanitis or dullness. To define Pasternatsky's symptom	
Evaluation of lab.data	To pay attention to changes in blood analysis, content of urea and creatinine. Interpret general analysis of urine, bacteriologic analysis of urine	Anemia, leukocytosis, ESR. Type of causative agent, sensitivity
Evaluation of X-ray results, USI	Presence of shadows of X-ray contrast calculi on plain urogram and excretory urograms, assess contours and sizes of kidneys, state of abdominal system. On cystourethrograms – contours of urinary bladder, urethra.	Presence of uretero-hydronephrosis. Trabecularity, enlargement of urinary bladder volume, filling defects, refluxes, diverticuli.
Instrumental studies	Cystoscopy. Urethroscopy.	Capacity of bladder, trabecularity, residual urine, tumors, calculi. Walls, strictures, valves.
Other studies	Uroflowmetry	
Diagnosis and treatment	On the basis of the data obtained – to make diagnosis, possible complications. To make plan of treatment.	

Tests of III level.

1. In infant formation of red colors, of round form are observed over the pubis. On examination: urine is excreted by kidneys from both orifices, located in the lower part of formation. What is developmental anomaly? What age surgery is indicated, its variants? Recommendations after surgery?

Answer: bladder extrophy. Surgery at the age of 1 year and later. Transplantation of bladder triangle into rectum. After surgery to monitor urea and creatinine levels, body temperature.

2. Boy, 3 years of age is restless on each urination, urination with tension. Therewith, in the area of penile balanus – mace-like widening. In anamnesis: frequent inflammatory processes (balanitis, balanopostitis). Diagnosis: what complications of this developmental defect may develop? Optimal age for surgical intervention?

Answer: phimosis. Complications: paraphimosis, balanitis, balanopostitis, sometimes - ureterohydronephrosis. Preventive measures: to stretch external orifice of prepuce of penis, Rozer's surgery, circular excision of prepuce

Oriented card for independent work with literature

Basis tasks	Directions	Answers
Etiology of polycystic renal disease	To name basic etiologic factors of polycystic renal disease	Disorders of confluence of direct and convoluted parts of tubules in embrional period
Clinical picture of the disease	To name basic symptoms of disease	Pain in the lumbar area, pyuria, hematuria, hypertonia

Diagnostics	To give list of basic diagnostic methods	Palpation of kidneys, excretory urography, USI, CT, MRT
Differential diagnostics	To make differential diagnostics against other diseases	Renal tumors, multicystosis, hydronephrosis, pyonephrosis
Treatment	To make typical treatment scheme	Diet regimen, anti-inflammatory means, hypotensive means, desintoxication

Library:

A) Basic:

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8. Д.Ю. Пушкарь. Урология: основные разделы. – М.: - МЕДпресс-информ, 2004.

9. Бібліотека студента медика. Урологія. За ред.. Ф.І. Костєва. – Одеса, 2004.

10. Ф.М. Ханно, С.Б. Малкович, А.Дж. Вейна. Руководство по клинической урологии.– 3 изд. – М.:ООО «Медицинское информационное агенство», 2006.

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Module № 1

Thematic module №1

Theme of the lesson: «Symptom complex of urologic diseases».

Actuality of the theme

Actuality of this section of urology is defined by the fact, that many diseases of urinary system and male genital system have characteristic manifestations; all mentioned give peculiar features to symptom complex of urologic diseases. Symptoms of urologic diseases may be general and local ones. General symptoms develop due to reaction of the whole organism to the impact of pathologic causative agent, local ones depend on localization and character of lesion. It is local manifestations that give peculiarities to urologic diseases.

Education aims.

To learn the most often symptoms developing in case of renal diseases, urinary ways and male genital organs (pains, disorders of urination, quantitative and qualitative changes in urine, pathologic discharges from urethra), to master causes and mechanisms of their development to correctly take case-history, purposeful carrying out objective study and interpreting analysis of urine.

Student must know (a=III).

-Defining and clinical meaning of symptoms of urologic diseases.

-Differences of symptoms of acute urine retention, anuria, hematuria and uretrography. Types of hematuria depending on bleeding source.

-Diagnostic meaning of qualitative and quantitative changes in urine.

- Mechanism of development of pre-renal, renal and post-renal anuria.

Student must be able to (a=III).

- define renal colic and be able to differentiate it with acute surgical diseases of abdominal cavity organs (patients, materials of lectures, textbooks).

- explain clinical meaning of symptoms of urologic diseases in graphologic structure of a lesson (materials of lectures, textbooks).

- analyze difference of symptoms of acute urine retention and anuria, hematuria and uretrorrhagia (patients, materials of lectures, textbooks, samples of analyses).

- analyze general analysis of urine (samples of analyses).

- classify disorders of urination (materials of lectures, textbooks, patients).

Practical skills to be mastered at practical class

Palpation of the urethra and scrotal organs

Palpation of the prostate gland

Interdisciplinary integration

Discipline	**To know**	**To be able to**
Human anatomy	Nephron as a structural unit of kidney	To be oriented in anatomical terminology
Topographic anatomy	Topography of kidneys, urinary bladder, ureters, prostate gland, scrotal organs	
Normal physiology	Physiology of urine formation	

Biological chemistry	Ranging of content of nitrous component in the blood plasma; particles of urinary sediments in dependence on physiologic state of organism and pathology, pathologic components of urine, pyuria, chyluria, hematuria, pneumaturia, hemoglobinuria	
Introduction in internal diseases	Disorders of urination, frequent urination, oliguria, anuria, nocturia, bacteriuria, pollakisuria	To interpret general analysis of urine. To palpate kidneys, urinary bladder
Neurology	Osteochondrosis with secondary radiculitis	To make differential diagnostics of neurologic diseases against renal colic
Therapy	Diabetes mellitus and diabetes insipidus, nephrogenic, psychogenic diabetes	To interpret polyuria, anuria as urologic pathology, excluding therapeutic diseases
Nephrology	Nephrologic diseases. Acute and chronic glomerulonephritis	To differentiate true and false proteinuria
Surgery	Clinical picture of acute surgical states («acute abdomen»)	To make differential diagnostics against renal colic

Interdisciplinary integration

Urology	To learn the most often symptoms of kidney diseases, of urinary ways and male genital organs(pain, disorders of urination, quantitative and qualitative changes in urine, (pathologic discharge from urethra), to know causes and mechanisms of their development for correct taking case-history, purposeful carrying out of objective examination, interpreting of analysis of urine	To find out deontologic approach to patient, to carry out "three-glass" test. To establish localization of pathologic process to define complex of symptoms for every pathology

Structural-logical scheme of content

Clinical structure of symptoms of urologic patients

Educational elements		
1-st order	2-nd order	3-d order
Pain in the area of urogenital organs	Renal colic Pain in urinary bladder diseases Pain in prostate gland area Pain in the ureter area	Symptoms Causes Differential diagnosis Treatment measures
Disorders of urination	Pollakisuria Stenanguria Enuresis Acute urinary retention Involuntary urination Incontinence of urine	Daily Nocturnal Constant Neuro-reflector one

	Chronic urinary retention	Of mechanic character True False Paradoxical ischuria
Qualitative changes of urine	Polyuria Oliguria Anuria	Arenal Prerenal Postrenal Renal
Quantitative changes of urine	Proteinuria Color and transparency of urine Pyuria Hyperstenuria Hypostenuria Isohypostenuria Hematuria Hemoglobinuria Chyluria Pneumaturia Bacteriuria	True False Defining of latent pyuria Active leukocytes Two-glass test Initial Terminal Total
Pathologic discharges from urethra	Purulent Urethrorrhagia Spermatorrhea Prostatorrhea	

Link with other disciplines.

Symptoms which are observed in urologic patients may be leading in case of neurologic, therapeutic, surgical, gynecologic and other diseases.

Pain in the lumbar area, which occurs in neurologic patients, suffering from osteochondrosis with secondary lumbar-sacral radiculitis, very often is considered as pain of renal origin, due to this patients take different medicamental agents. From the other side, pain in case of renal diseases stimulate different radiculopathies, due to this fact urologic patients receive treatment caused by radiculitis for a long period of time while renal diseases progresses. Severe radiculalgias are observed in case of metastasis of renal cancer or prostate gland cancer into pelvic and lumbar bones Every patient followed up by neurologist because of un-established etiology of sacroileitis, radiculitis must be examined by urologist to exclude urologic pathology. Therewith, important significance is given to palpation of kidneys, prostate gland, interpreting of general analysis of urine. In presence of pathologic changes in urine, patient is administered complex urologic examination, which will allow to clear up true cause of pain It is necessary to know, that multiple disorders of urination, even paradoxical ischuria may be caused by dysfunction of urinary bladder, linked with acquired, congenital diseases or traumas of spinal cord. Micro- or macrohematuria is by no means always is a symptom of urologic disease. Zone may develop in case of fibrinolysis disorder. Vitamin C or K deficiency may also lead to appearance of blood in urine. Cardiac diseases with embolisation of renal vessels and renal infarction as well as anti-coagulant usage and nephrotoxic medicines may be the cause of the latter. Besides, hematuria develops in case of nephritis of various genesis among which post-streptococcal glomerulonephritis occurs the most often. From this follows, that task of a therapeutist is to exclude extra-urinary sources before referring patient with hematuria to urologist. In interpreting polyuria it is necessary to exclude diabetes mellitus as well as diabetes insipidus (hypophyseal, nephrogenic, psychogenic). Clearing up etiology of different types of anuria is necessary in urgent order. In practice of therapeutist, anuria (oliguria) may

develop in case of embolism of both renal arteries or in case of thrombosis of renal veins, as well as in pathologic process of a single kidney.

The most often the cause of pathologic proteinuria (more than 150 mg of protein in daily urine) is not urologic but nephrologic diseases. Acute and chronic glomerulonephritis belongs to them. More often it is necessary to make differential diagnosis of a right-side renal colic against acute appendicitis. To give correct medical care, renal colic must be differentiated from such surgical diseases as, acute pancreatitis, perforating gastric or duodenal ulcer, acute cholecystitis, intestinal obstruction.

In case of false interpreting of pain two mistakes may happen: a) renal colic is considered as an acute surgical disease of abdominal organs and patient is subjected to unjustified surgical intervention; this is not always favorable for disease prognosis, b) acute surgical disease is considered and treated as renal colic; this leads to peritonitis development. Correctly taken case-history, taking into account pain character, peculiarity of its development, irradiation, data of objective and laboratory study allow in the majority of cases to correctly reveal cause of the disease.

Surgeons often must follow up patients with acute renal incontinence, especially in post-operative period, when it has reflector character most often. Knowledge of consequence of treatment manipulations in various causes of a given symptom is obligatory for a surgeon.

Disorders of urination (pollakisuria, etc.) are often symptoms of diseases of female genital organs. Orienting in changes of urine (visually and by the laboratory study data), it is possible to differentiate disorders of urination and pains in the lower abdomen, which are caused by the diseases of female genital organs, from urologic ones.

In case of pregnancy pathology (nephropathy, eclampsia) quantitative and qualitative changes of urine appear; their correct interpreting gives possibility to timely differ these pathologic changes.

CONTENT OF THEME OF THE LESSON

Symptoms of urologic diseases may be general and local ones. General symptoms appear due to reaction of the whole organism to impact of pathologic causative agent; local ones depend on localization and character of lesion. It is local manifestations that give peculiarities to urologic diseases. Patients, who complain of discharge from urethra and disorders of sexual function (coupulative and reproductive) present peculiar group.

Renal colic is one of the most often symptom of urologic diseases. Patients with renal colic seek doctor's advice from general practitioner (local physician, surgeon, doctor of emergency aid rendering) who must be sure in exactness of diagnosis before treating attack. From this follows, that knowledge of symptoms of renal colic, its differential diagnostics is obligatory for a doctor of any profile. Each patient who had renal colic must be examined by urologist with the purpose to establish its cause and diagnosis.

In case of independent study, among disorders of urination **acute retention of urine** should be paid attention to. Doctor must establish its cause, to give correct medical care. Now, taking into account nosocomial infection, catheterization of urinary bladder must be considered very accurately. From the point of view of prevention of urinary ways infection, while giving medical care and in the absence of effect of conservative measures, supra-pubic puncture of urinary bladder is more rational; after this, patients must be referred to urologist.

While establishing amount of **residual urine** it is necessary to use non-invasive methods (USI, X-ray, radio-isotopic) more widely than catheterization of urinary bladder.

Involuntary urination and incontinence of urine are the symptoms with different mechanisms of development. Their clinical evaluation gives possibility to suspect a series of diseases, which are localized in the area of urinary bladder cervix, as well as defects of development of urinary genital system organs.

Quantitative changes of urine (polyuria, oliguria, anuria) as well as changes of their density in urologic patients testify to disorders of kidney function (chronic or acute renal insufficiency). While giving medical aid to a patient with anuria, first of all it is necessary to define its form (arenal, prerenal, renal, postrenal). In other case treatment will be not correct.

In presence of expressed **proteinuria,** especially in normal or not sharp elevation of content of corpuscular elements in urine (leukocytes and erythrocytes), first of all examination of a patient should be directed at revealing or excluding of glomerulonephritis.

Pyuria and bacteriuria – signs of inflammatory process of urogenital system in males and of urinary system in females. Analysis of urine allows not only to suspect or reveal inflammatory process (pyelitis, pyelonephritis, cystitis, urethritis, prostatitis, vesiculitis, and others), but to control treatment process.

Hematuria also may be a sign of inflammatory process, however it, first of all, must be considered as a sign of destructive process (lesion of mucous membrane with calculus, tumor). In such a case every process, which caused macrohematuria may cause microhematuria as well. In spite of hematuria expressiveness, clinician must examine patient. Interpreting of initial, total and terminal hematuria plays role of starting point for the further examination of patient to establish diagnosis.

Macrohematuria in adults in the absence of other symptoms most often is a sign of cystic cancer. Macrohematuria and feeling of discomfort on palpation of tumor in the lumbar area must direct examination of patient for searching of renal tumor.

Students independently examine patients in hospital, main attention must be paid to anamnesis, disease development, presence of allergic diseases in the past, hereditary anamnesis, presence of diseases of other organs and systems, differentiate against other similar diseases, make plan of additional methods of examination.

Questions of II level.

1. Name signs of renal colic.
2. What does acute retention of urine mean?
3. Causes of pre-renal anuria.
4. Causes of renal form of anuria.
5. Hematuria, its types in dependence with localization of bleeding source.
6. Paradoxical ischuria, its pathogenesis.
7. What is the difference between hematuria and urethrorrhagia?
8. Bacteriuria, its types.
9. Urine incontinence, its types.
10. What is the difference between anuria and acute urinary retention?

Tests (a =II)

1. What does total leukocyturia testify to?

*1) Pyelonephritis

2) Chronic prostatitis
3) Acute pyelonephritis

*4) Cystitis

2. Anterior surface of kidney contacts with

* 1) liver;

2) cecum;

* 3) ascending portion of colon;
* 4) descending portion of duodenum;
5) mesenterium of transverse colon.

3. What is the succession of action while examining patient with macrohematuria?:

1. cystoscopy;

2. “three-glass” test;

3. ultrasonic investigation;

4. plain and excretory urography;

5. emergent hospitalization to in-patient department.

* 1. 5.2.3.1.4.

2. 5.2.3.4.1.
3. 2.3.4.5.1.
4. 2.4.5.1.3.
5. 3.4.5.2.1.

4. To control renal colic the following medicines are used:

а) baralginum,

б) no-spa in the dose: 1-2ml 3 times daily i/m, 2,5ml 2 times daily:

a-2, b-1 a- 1,6 - 2

5. Place methods of defining residual urine as invasiveness growths:

1) roentgenologic;

2) USI;

3) radio-isotope;

4) catheterization of urinary bladder:

2, 3, 1, 4
2, 1, 4, 3
1, 2, 3, 4
4, 3, 1, 2
1, 3, 4, 2

Situation tasks (a = II)

1. Mother complains of that her 5-year-old child during sleep develops urination. On examination: in general analysis of urine no pathologic changes in urine were revealed. What disease is it?

Answer: this disease is called enuresis. More often it develops in boys.

2. In patient 23 years- of- age urine has a noticeable opacity due to admixture of leukocytes and bacteria, but localization of inflammatory process is unknown. What accessible method of investigation should be used?

Answer: method of investigation – "two-glass" test (in the first glass – initial leukocyturia – inflammatory process is in urethra; in the second – total leukocyturia – inflammatory process may be localized in any portion of urogenital system.

3. Male patient, aged 74 years. During 2 years period has been observing difficult urination, therewith it was necessary to tense, flabby flow of urine, which interrupted often. On admission to the hospital – urine incontinence, constant bursting open pain over the pubis, with protrusion, upper edge of protrusion contours is at the umbilical level. On percussion: dullness in this area was noted. During some days constantly, without control - dribbled urination. What disorder of urination does this patient have?

Answer: paradoxical ischuria.

Professional algorithm of examination of a patient.

Tasks	Succession of actions	Notes, means of control.
1.To master method of interpreting general analysis of urine	1.To write down data of general analysis of urine within the norm 2.To compare analysis from case-history with normal ones. 3. To draw conclusions.	
2. Carrying out of "three-glass" test - by forms of macrohematuria to define source of bleeding	1. To explain to a patient how is test performed. 2. To assess obtained results	
3.To master procedures of defining residual urine and to be able to use them	1. USI 2. Radiologic 3. Roentgenologic 4. Urinary bladder catheterization	
4. To be able to distinguish anuria from acute urine retention (AUR)	1. In case of AUR bladder is overfilled. 2. In case of anuria it is empty.	
5. To perform palpation of kidneys in different positions	1. In patient's supine position 2.On the right side, left side 3. In standing position	To pay attention to sizes, form, mobility, tenderness

6. To master percussion of urinary bladder		
7. To master skills of defining Pasternatsky's symptom	1. It is performed in patient's lying in bed from healthy side 2. To slightly percuss along the 12-th rib 3. In appearance of pain, symptom is believed as positive	
8. Writing case-history	1.Complaints. 2. Case history 3. Past history 4. Objective status 5. Initial diagnosis 6. Administering of additional investigations 7. Carrying out of differential diagnostics	

Situation tasks of III level

1. Patient, aged 32 years, complains of acute pain in the right side of the abdomen, nausea, vomiting. Fell ill 2 hours ago. Delivered to reception ward by ambulance. Objectively: temperature - 36,9°C, pulse - 62 beats per hour. Right portion of abdomen lags behind in act of respiration. Pasternatsky's symptom is positive in the right. On palpation of the abdomen local tenderness is noted in the right iliac area. Peritoneal symptoms are absent. Frequent urination by small portions.

What disease may be considered, why? What additional examinations are necessary to perform to establish diagnosis?

Answer: In this case is impossible to exclude appendicitis or renal colic without additional methods of investigation. That is why it is obligatory to administer general blood analysis, analysis of urine, to do USI of kidneys, urinary bladder.

2. Female patient, 23 years old, married 6 weeks ago. Before marriage did not have sexual relations. Complains of frequent imperative urge to void urine. Fell ill 4 days ago. Before this urination was 4-5 times a day, but from the moment of illness- frequent urination and in two days it became followed by pain. The urge to void urine was present, but quantity of urine was too small. Today in the morning patient noted a small amount of blood on the toilet paper after urination. Patient does not remember if urinary bladder is emptied after sexual contacts.

Objectively: sharp tenderness on deep palpation in the sub-pubic area. No signs of enlargement of urinary bladder on percussion. Analysis of urine: dark yellow color, pH- 6,0, density - 1029, erythrocytes - 60 - 80, leukocytes - 40 - 50 in a big field of vision.

What diagnosis may be established on the basis of these symptoms?

What are the means of its prophylaxis in this given case? Carry out differential diagnostics with urinary bladder cancer.

Answer: The most likely this patient is ill with cystitis. Its prophylaxis is urination after sexual contact. But presence of blood in urine causes the necessity to carry out differential diagnostics against cystic cancer.

Tests of III level.

	Anuria	Polyuria	Stranguria	Pollakisuria	Incontinence of urine	Involuntary urination	Acute retention of urination	Chronic retention of urination		
Imperative feeling of urination	-	-	+	-	-	+	-	-	-	-
Output of urine during a day > than 2 l.	-	+	-	-	-	-	-	-	-	+
Feeling of incomplete emptying of urinary bladder	-	-	+	-	-	-	-	+	+	-
Dribble urination without feeling of urination	-	-	-	-	+	-	-	-	-	-
Frequent urination	-	+	+	+	-	+	-	+	-	-
Urine coloring with blood	-	-	-	-	-	-	-	+	-	-
Difficult urination, followed by pain	-	-	+	-	-	-	-	+	-	-
Diuresis1,5-2 l	-	-	-	+	+	-	-	-	-	-
Diuresis < than 50 ml	+	-	-	-	-	-	-	-	-	-

Oriented card for independent work of students with literature

Tasks	Directions	Answers
To learn:	To name causes of anuria acute urinary incontinence, hematuria, polyuria, renal colic.	
Etiology		
Clinical manifestations	To make classification of incontinence of Urine	
Diagnostics	To name basic signs of hematuria, renal colic, urinary incontinence, acute urinary retention. To make scheme of differential diagnostics of renal colic with acute surgical diseases of abdomen, such as acute appendicitis, acute pancreatitis acute cholecystitis perforating duodenal or gastric ulcer.	
Treatment	To make treatment scheme of - renal colic - acute urine retention - prerenal anuria form - postrenal anuria form - hematuria - paradoxical ischuria	

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Module № 1

Thematic module №1

Theme of the lesson: «Roentgenologic and radioisotope methods of investigation».

Actuality of the theme

Final anatomical and physiological information for correct topical justification of urologic diagnosis and choice of the most optimal treatment tactics is obtained by means of roentgenologic and radioisotope methods of investigation. On the other hand a great choice of roentgenologic and radioisotope methods of examination of urologic patients causes the necessity of special attention paid to mastering this theme

Educational aims.

To elucidate role and place of roentgenologic and radioisotope methods of investigation in diagnostics of diseases of the kidneys, urinary tract and male genital organs, considering indications and contraindications to perform a number of investigations independently, to timely refer patients to specialized treatment-diagnostic subunits.

Student must know:

a) roentgenologic anatomy of urogenital system;

b) succession of roentgenologic investigation while suspecting diseases of kidneys and those of urinary bladder;

c) possibilities of diagnostics of plain urography and roentgen-contrast means of investigation;

d) up-to date roentgen-contrast agents, which are used for visualization of urinary tract;

e) indications and contraindications concerning various roentgen-contrast methods of investigation of urinary system;

f) indications to up-to date radiologic methods of investigation and their possibilities in diagnostics.

Student must be able to:

1) give first medical aid in case of idiosyncrasy to roentgen-contrast substances containing iodine (set of contrast materials and instruments);

2) on the plain urogram to define contours of kidneys, edge of lumbar muscle, shadows of true urinary calculi and false ones (phleboliths, calcareous lymphatic glands, etc.) (set of images);

3) to calculate necessary amount of contrast fluid, taking into account patient's weight to make excretory urography (set of situation tasks);

4) to perform retrograde cystography (on lay figure);

5) to interpret roentgenograms in contrast means of investigation (excretory urography, retrograde ureteropyelography, renal angiography, various types of cystography, urethrography) (set of images);

6) to do assessment of separate function of the kidney by data of radiologic investigations (collection of tests).

Content of the theme.

Kidneys are located on both sides of the spinal column: at the right – on the level of XI thoracic and III lumbar vertebrae; at the left – one vertebra higher.

There are distinguished two basic variants of location of kidneys: high and low. In case of high location, kidneys are hidden behind XI and XII ribs, in case of low location – come out from lower edge of XII rib. Longitudinal centerlines of kidneys are directed obliquely from top to bottom and outside, that is why if

position of kidneys is high, renal angle between these centerlines does not exceed 15°, if it is low – reaches 30°.

Sizes of the kidneys in adult person is 12x7 cm. on average. In children height of renal area of the spinal column is relatively less, than in adults, lower edges of kidneys are located closer or at the level of crest of iliac bone. In infants upper edge of the left kidney is located at the level of XI thoracic vertebra, and of the right one – XII, lower end of the left kidney reaches IV, and of the right one – V lumbar vertebra. Left kidney is located higher than the right one in 60 % of cases.

Sizes of the kidneys in children depend on their age. In newborns length of kidneys equals on average 4,8 cm, and width – 2,9 cm, in children aged 6-7 років – correspondingly 9,2 and 4,7 cm, 14-15 years – 11,7 and 5,6 cm.

Length of the kidney in children over 5 years of age is defined by the formula x = 0,379y, where x – length of kidney, y – child's age.

In the norm length of the right and left kidneys differs not more than by 1cm. In the course of growing of a child, lower edges of kidneys part, and upper ones become closer.

Functional and morphologic changes of kidneys are assessed both visually and by means of defining a number of quantitative findings, specifically by renal-cortical index (RCI).

$$RCI = (-i_{AB}^{C.D}) \bullet 100\%,$$

where AB: A – length of kidney; B – its width; C – length of pelvic-caliceal shadow; D – its width.

In the norm RCI is 60-62 %, and its decrease testifies to reduction of amount of renal parenchyma.

Kidneys are movable and in each breathing in displace approximately by height of one vertebra. Respiratory mobility has a definite importance for urodynamics. It is disturbed in the presence of sclerotic or inflammatory process in pararenal tissue during lesion of kidney proper, because in this case enlargement of the kidney and its fixation to the surrounding tissues is observed.

Renal pelvis is located at the level of I-II lumbar vertebra. System of renal pelvises and calices is distinguished by significant variability, that is why to assess it specific experience is necessary.

Position of renal pelvis may be out-, intra-renal or, more often, transitory. Distal part of renal pelvis in the funnel-like shape passes into renal pelvic-ureteral segment. Usually kidney has three big renal calices – upper, middle and lower, from them one or some small calices come. Big calices have neck and apex, small calices come from them. On usual roentgenograms, made in patient's position lying on the back, small calices are seen partially through ventral or dorsal direction. Line, connecting apices of calices is located in parallel to outer renal contour.

Ureters have 4 physiologic constrictions along their length: 1) at the place of passage of renal pelvis into urethra; 2) over iliac vessels; 3) in the prevesical area (juxtavesical part of ureter); 4) in the intramural portion of ureter. On excretory urograms in the norm ureters are seen only partially; this is explained by the fact that urine flows by separate portions, and section filled at the moment of exposure is revealed only. On X-ray picture one can see places of physiologic constrictions. Length of ureter in the adult person makes up 25-30 cm on average, its inner diameter – 0,4-0,6 cm.

In infants ureter moves off renal pelvis higher, than in adults and lies nearer to the spinal column. As upper edges of kidney come closer, ureter occupies its usual position.

Elastic and muscular tissues of urinary ways in children are poorly developed, their contractility is relatively small. Due to this congestion of urine develops even in case of insignificant obstacle to outflow, e.g. in physiologic folded structure of mucous membrane.

Urinary bladder has various forms, it depends on stage of its filling. Anterior, posterior, upper, lower, right and left lateral walls of it are distinguished. In case of standard introduction of 100 ml of substance in it, contours of urinary bladder are even, distinct, form is round with somewhat reduced diameter at the top, or it may be of oval form. Lower contour passes in parallel to pubic symphysis or somewhat lower. Configuration of urinary bladder changes in case of its pathologic changes and those of other organs, bordering with it.

In newborns urinary bladder is located intra-peritonealy, but later it gradually lowers. In the state of filling urinary bladder has pear-shaped or oval form and reaches apex of II lumbar vertebra. Capacity of urinary bladder depends on child's age: before 1 year of age it is 30-35 ml, from 1 to 3 yearsв – 90 ml, from 3 to 5 – 100-150 ml, from 9 to 12 – 200-300 ml, from 12 to 15 – 300-40 ml.

Female urethra is visualized on mixed urethrogram (picture may received during urination after introduction of contrast substance) or ascending urethrogram. Urethrogram in females is performed extremely rarely; it is done only in children with the aim to diagnose defects of development.

Male urethra forms two curves – at the level of the angle, formed by the root of penis and scrotum and lower edge of pubic symphysis. On urethrograms prevesical part of urethra is significantly narrower, than in other places. This fact should be considered while diagnosing its constrictions. Sometimes at this level filling defect which corresponds to seminal tubercle is revealed.

External sphincter of the urinary bladder divides male urethra in anterior and posterior portions. In the anterior portion of urethra spongy part is distinguished, in the posterior – membranous and prevesical ones.

Female urethra is significantly shorter, than male. On urethrogram it looks like a short wide strip with even contours.

Urethra in children has some anatomic peculiarities related with age. Sizes of urethra in boys depend on age. Before the age of 12-14 years urethra grows slowly. Its intensive growth is observed in pubertal period, when along with growth of spongy part prevesical one also growth.

Due to a high height of urinary bladder prevesical part of urethra in newborns is longer than in children of elder age. Its length is up to 0,9 cm, and membranous one is up to 1 cm. This part occupies space between apex of prevesical gland and spongy portion. This is the longest part.

Spongy part of urethra is the longest. In a newborn its length is 4,5 cm, it has two dilatations: in the area of spongy part and at the level of penile balanus (navicular fossa). The narrowest site is external urethral opening.

In the norm in boys urethra has different image on roentgenogram; it depends on child's rate and phase of urination. Curvature is expressed more as compared with adult. Posterior portion of urethra forms angle (almost obtuse) in relation to anterior portion, its diameter is less, especially in membranous portion. On roentgenogram boy's urethra is wide, with distinct even edges. On mixed cystourethrogram it has cylinder form in some cases. Often along its passage irregularities, circulatory constrictions, retractions or protrusions are revealed; they are caused by uneven contraction of walls or muscles, located paraurethrally. These defects may be differentiated from limited stenosis by means of serial cystourethrography, serial big-framed cystourethrofluorography, cystourethrotelescopy or roentgen-cinematography.

Urethra in girls and posterior part of urethra in boys are the same in embrionology and anatomical structure. They have almost identical picture on roentgenogram,

In the norm urethra in girls is of cylinder form on roentgenogram. Its walls are even, mutually in parallel and gradually come closer in the direction of external opening. Diameter of distal and proximal parts is approximately the same. Both in boys and girls along its passage urethra may have irregularities. Due to this, in girls three types of urethra are distinguished: cylindrical, fusiform and coiled.

On the basis of mixed cystourethrography, performed at the height of urination act with intra-bladder pressure and filling being maximal, one can consider the type of urethra. At the onset and at the end of urination urethra of any type may have cylinder form and narrowed lumen. As its middle part is the most elastic (is able to stretch), on mixed cystourethrograms quite often urethra is of fusiform. Its sharp fusiform-like dilatation is typical for distal stenosis.

When pathology is absent, diameter of middle part of urethra exceeds diameter of distal and proximal parts by 2 times.

Deferent ducts and seminal vesicles may be seen on roentgenogram only after introduction of roentgen-contrast substance. With this aim previously deferent duct is exposed and punctured. Water- or fat-soluble substances are used as contrast ones.

Deferent ducts look like thin threads, seminal vesicles are cluster-like formations, located on both sides higher than prevesicle gland. Urogenitography is made to reveal stage of potency of deferent ducts or to reveal pathologic process in seminal vesicles.

Preparation for X-ray study

First of all expediency of X-ray study should be defined, case-history, patient's complaints should be investigated in details, results of urine tests, urea, rest nitrogen in blood and Zimnitsky's test should be analyzed.

Quality of X-ray pictures, by and large, depends on preparation for investigation. Procedure of roentgenography, envisaging the least radiation loading should be chosen. Besides, it is necessary to maximally empty patient's intestines from gases, feces. Presence of gases in the rectum not always testifies to insufficient preparation of a patient. In children of younger age, as well as in case of renal insufficiency, attacks of renal colic, concomitant diseases of the liver intense gas-formation is observed, and it is almost impossible to sufficiently empty intestines from gases.

Preparation of patient is begun 2-3 days before study. Food products which are favorable for gas-formation (cabbage, potato, fruits, beans rye bread, milk, sugar, etc.) are excluded from dietary intake. Patient is administered carbolen (activated carbon) by 0,5-1grams 4 times a day. For prevention of gas-formation on an empty stomach, patient is allowed to have glass of strong tea without sugar with biscuit made of wheat bread.

Investigation of urinary tract in children is performed strictly at physician's presence. During investigation of infants temperature in X-ray room must be not lower than +30°C.

It is better to use such X-ray apparatus, which possesses minimal exposure for infants. Taking into account high sensitivity of children to ionizing radiation, great attention should be paid to anti-radiation defense. All areas of a child's body, except area under investigation, should be covered with lead-impregnated rubber. Genital glands should be covered especially thoroughly. When the occasion requires, children are fixed by means of well fitted mechanic means. Gentle

behavior with a sick child, taking into account his/her age makes it possible to have good contact and to successfully do X-ray investigation. Some complicated X-ray studies are performed under narcosis.

Children of young age in the evening before investigation receive cleansing enema, in the morning they have mild breakfast. X-ray pictures are made after it. In elder children 1-2 days before investigation are limited in the number of carbohydrates; 1-1,5 hour they are administered cleansing enema. In the morning they have sandwich and sweeten tea. In intravenous introduction of contrast substance biologic test is recommended: after introduction of some milliliters of agents which contain iodine, there is some minutes break, if reaction is absent, necessary dose is introduced slowly.

Quality of X-ray picture also depends on correct choice of roentgen-contrast substance. Iodine-containing substances are divided into ionic and non-ionic. It is preferable to use non-ionic substances (omnipac, ultravist); they have less number of side-effects. Ionic substances used are urograrin, triombrast, trizograph and other water-soluble 3-iodine-containing contrast substances.

X-ray methods of diagnostics of urologic diseases must precede X-ray examination of abdominal cavity organs, because barium which remains in the intestine after examination of pelvic organs may cause wrong interpretation of urograms.

X-ray methods of investigation

Plain urography. X-ray examination of kidneys and upper urinary ways is begun with plain image – plain urography. Plain urography must enclose the whole urinary system from the upper ends of kidneys to the lower edge of pubic symphysis. Image should be made on the X-ray film with the sizes of 30x40 cm. Image is distinct in case when intestinal gases do not close areas of location of kidneys, and external edges of lumbar muscles are distinctly defined.

On plain urogram shadows of kidneys are revealed; this allows to judge about their configuration and localization, sizes, contours, presence of concrements.

Usually radiologist draws conclusion about presence of shadows, suspicious-looking concrements, because these shadows may coincide with the place of projection of urinary ways, but caused not by them. As an example, sometimes these shadows may be caused by calcareous lymphatic glands. In these cases roentgen-contrast substance must be introduced and only after this investigation, conclusions as for pathology may be drawn.

Plain urography makes it possible to define: a) structure of bone tissue of the seen parts of skeleton (lower ribs, spinal column, pelvis, hip joints); b) position, size and form of kidneys, their contours and structure of shadow; c) distinctness of contours of lumbar muscles; d) presence of shadows of concrements in the kidneys and urinary ways, prevesicle gland as well as presence of calcification in the organs of abdominal cavity and retroperitoneal area.

Quite often on plain image anomalies of skeleton, its pathologic changes, causing disorders of functions of urinary system may be seen.

Renal contours are observed in 60 % of cases. Increase or decrease of kidney sizes is a sign of anomaly (hypoplasia, polycystic renal disease, etc.) or consequence of pathologic process (shrinkage of kidneys, neoplasm, etc. Unusual position of kidney testifies to anomaly or pathologic motility, pushing it aside by some neoplasm. In the norm shadow of kidney is homogenous, that is why plain urography makes it possible to reveal calculi of urinary organs, except for roentgen-negative (urate, xanthine, cystine ones).

Foreign bodies in retroperitoneal area, fecal bolus, urinary stones, calcified cavern, phlebolith, calcified areas of neoplasms or lymphatic glands, etc. may be mistakenly considered as nephroliths. Sometimes on plain image one can see multiple shadows of fine dense concrements, which are localized predominantly

in the layer of cerebral substance of renal parenchyma or in the area of renal papillae. Predominantly nephrocalcinosis develops in children with renal tubular acidosis.

Edges of lumbar muscles in the norm may look like a strip with distinct contours, coming from I lumbar vertebra to the pelvis. Absence or smudged contour of this muscle in one side may testify to timorous or inflammatory process in retroperitoneal area. In the norm in pre-school aged children edge of lumbar muscles is defined insufficiently; this symptom is not taken into account, while making diagnosis. When ureters on the plain image in the norm are not seen, contours of urinary bladder may be defined in its filling in with concentrated urine.

On plain urogram in the urinary bladder calculi or foreign bodies which got into it through ureteral lumen may be revealed.

Excretory urography – X-ray method of investigation of kidneys and urinary ways, which is based on selective ability of kidneys to excrete introduced into organism definite roentgen-contrast substances. This method is fundamental one in a complex of X-ray examination of children. This method makes it possible to assess functional and morphologic state of kidneys and urinary ways. Usually excretory urography is performed after plain urography.

Non-ionic three-atomic iodine-containing agents (omnipac, ultravist) with high concentration - 60-85 % are used as contrast substances. Newborns and pre-school aged children have good tolerance to rather high doses of roentgen-contrast substances.

Due to low concentration function of kidneys, infants under 1 year of age are introduced 3-4 ml of contrast substance per 1 kg of body mass, children from 1 до 3 years – 2-3 ml/kg (10-15 ml), after 3 years of age – 1-2 ml/kg (20-30 ml), but not more than 60 ml in the aggregate. The most often these substances are introduced warmed up into the veins of elbow flexion during 1-2 minutes.

Before excretory urography patient's sensitivity to contrast substance is checked up: intravenously 1 ml of solution is introduced. If reaction is absent, roentgen-contrast substance is injected slowly during 2-3 minutes (for adult - 0,5-1ml per 1 kg of body mass). Image is made in horizontal position of patient. In specific cases roentgen-contrast agents, containing three atoms of iodine in molecule, may be introduced intramuscularly or subcutaneously; in infants they are introduced intravenously, intaosseously, rectally and into crown of head. Infants under 6 months of age are recommended 50-60 ml to be introduced rectally, from 6 to 12 months - 60-75 ml, after 3 years of age – 100 – 120 ml.

1-2 minutes after intravenous introduction of agent, saturation of the whole renal parenchyma is observed. On X-ray picture performed at this moment, on nephrogram, - contrasted renal parenchyma is depicted. Caliceal-pelvic system and urinary ways are depicted in 5-10 minutes in case of satisfactory renal function. That is why the first picture is made 7-10 minutes after introduction of roentgen-contrast substance, second picture – 15-20 minutes later, and the last one – in 25-30 minutes. In case of lesion of renal function, postponed pictures are made – 40-60 minutes later, 1,5-2 hours later. One picture is expediently to be made on both on breathing in and breathing out (to precise stage of renal motility).

Excretory urography may be performed in conditions of deprivation or vice versa in case of increased diuresis.

While interpreting urogram, saturation of renal parenchyma with roentgen-contrast fluid, size, from, position, contours are defined; as well as time and intensity of filling caliceal-pelvic system and ureters with contrast substance, state of urinary bladder in dynamics, state of upper urinary ways. Time, distinctness of image appearance and rate of evacuation of roentgen-contrast substance makes it possible to define functional disorders, various deformations.

Indications to excretory urography: relapsing infection of urinary ways, changes in the urinary sediment, enuresis, anomalies of organs of urogenital system, disorder in urination act, arterial hypertension, pain in the abdomen, presence of neoplasm, prolonged elevation of temperature, absence of urination in a newborn over 7-day period.

Contra-indications to excretory urography: expressed renal insufficiency (level of urea exceeds 13,3 mmol/l, relative thickness of urine is less than 1,010) disturbance of liver function, that of heart, vessels; increased sensitivity to iodine-containing agents; first half of gestation period; diathesis, allergy.

With the purpose to define stage of renal motility, excretory urography is performed when patient is in horizontal and vertical position.

To intensify contrast image of urinary ways on urogram, in the period of early stages of renal insufficiency, infusion urography is performed. Roentgen-contrast substance is diluted to 35 % concentration with 5 %- glucose solution or isotonic solution of natrium chloride. It is introduced intravenously, by drops, during 5-30 minutes. Dose for adult person is 60-80 ml. For children under 1 year of age dose is calculated in such a way: 5 ml per 1kg of body mass, for children aged 3-5 years – 2-3 ml/kg, 7-14 years old – 1-1,5 ml/kg.

Urograms are done in 1, 10, and 20 minutes after introduction of roentgen-contrast substance, if necessary postponed images are made. On the first urogram renal parenchyma is depicted, because roentgen-contrast solution is not yet excreted into calices and renal pelvis.

Indications to infusion urography: child under 1 year of age, decrease of concentration and excretory function of kidneys, compensated renal insufficiency, small information value of excretory urography.

Possible complications: nausea, vomiting, hyperemia of facial skin, breathlessness, collapse.

While introducing roentgen-contrast substance both general and local reactions may be observed. Local manifestations (localized pain, redness of skin at the site of injection or of the whole arm, erythema, urticaria, running nose, conjuctivitis) disappear without any medication. General reaction may be manifested by swelling of larynx, lungs, disturbance of function of central nervous system (convulsion, hemiparesis, paralysis, disturbance of respiratory function), drop of arterial pressure, arrhythmia, collapse, coma, shock. Treatment is symptomatic. For the urgent help rendering, oxygen, 30%-solution of natrium thiosuphate, which neutralizes iodine agents, cardiac glycosides, antihistamines must be in the X-ray room.

While studying urograms, terms and stage of filling and emptying of renal calices, renal pelvises, ureters and urinary bladder should be defined. This makes it possible to judge about concentration and excretory ability (thus about morphology as well) of kidneys and urinary ways.

In the norm shadow of renal parenchyma is homogenous. In case of pyelonephritis, nephrolithiasis, tuberculosis, on the background of renal shadow one can notice lucid areas, which indicate indirect to lesion of parenchyma.

Excretory (infusion) urography is a functional tests, in case of good functioning of kidneys at 3-d minute renal calices and renal pelvises are contrasted distinctly, and at 5-7 minute – urinary bladder. Retarded coming of roentgen-contrast substance (or its absence) into one of kidneys testifies to decrease of its function. This situation may occur in case of renal colic and is explained by lesion (at this moment) uro- and hemodynamics.

Urethral shadows on serial excretory urograms in the norm change; this is explained by its contractility. In dyskinesia, spasm of renal calices and ureters is defined. Whether on excretory urogram urethra is revealed well along the whole length, this may point to decrease of its tonus.

During infusion urography due to a permanent coming of roentgen-contrast substance into bloodstream, kidneys are filled better and urethra may be seen along the whole its length.

In case of nephrolithiasis on excretory or infusion urogram one can see not only concrements, but their form and sizes, stage of lesion of renal function, urodynamics may be defined.

Amputation in case of deformation of calices, changes of renal pelvis and renal contours may point to presence of tumor.

Various forms of tuberculosis process is followed by contractility of calices, disjunction of renal papilla, single or multiple caverns, which may be joined with calices or with renal pelvis, as well as by change of configuration of ureters and urinary bladder.

These methods of investigation are of high information value in case of hydronephrosis and ureterohydronephrosis; using them it is possible to establish not only stage of dilatation of renal cavity, but to precise stage of lesion of renal function and to monitor treatment dynamics as well.

Renal **arteriography is** obtaining of roentgen-contrast image of renal arterial system.

Depending on mode of introducing roentgen-contrast substance in aorta, trans-lumbar, trans-umbilical and trans-femoral aortography is distinguished.

This method may be used for investigation of adults and children of elder age only; in younger children aorta has some anatomic-topographic peculiarities.

In the majority of cases trans-femoral aortography by Seldinger is used, it is a simple and safe method.

After treatment of operation field with two fingers of the left hand, femoral artery is palpated at the level of inguinal ligament and fixed. Femoral artery is

punctured by means of special trocar 2-3 cm lower from inguinal ligament. Guide with elastic end is introduced through the trocar, fixing it trocar is removed. Catheter is put on this guide and is introduced into femoral artery. Catheter is put on the guide and catheter is introduced along the guide into femoral artery, later into the aorta, simultaneously removing the guide, up to the level of origin of renal arteries from the aorta. 20-30 ml of roentgen-contrast substance is introduced into aorta, images are made. Having obtained series of roentgenograms, catheter is removed. On the site of puncture tight bandage is applied for 2-3 hours to avoid bleeding and hematoma development.

Catheterization of aorta in children under 3 years of age is often performed after baring of femoral artery.

To obtain distinct image of arterial system of kidneys, selective renal arteriography is performed: under control of roentgenoscope a special catheter with curved end is introduced into aperture of artery of one kidney. Images are made after introduction of 8-12 ml (5-10 ml for children) of roentgen-contrast substance through the catheter.

While examining children, sometimes trans-umbilical arteriography is used. In doing so, catheter is conducted through umbilical artery, which in children is obliterated not along the whole length.

Renal arteriography makes it possible to assess state of vessels and renal blood circulation, to define stage of lesion and to make differential diagnosis between neoplasm, solitary cyst, etc. as well. The most often renal arteriography is used while suspecting renovascular hypertension, and tumor especially.

In the norm renal arteries descend from aorta at the level of lower edge of the I lumbar vertebra, but deviations may happen within the limits of height of body of one vertebra.

Vascular pattern is evenly distributed in all portions of the kidney, arteries are seen along the whole length, up to the branching of V order. Marked nephrographic effect points to preserved renal function.

On angiograms made in dynamics, four phases of circulation of roentgen-contrast substance are distinguished: arteriogram; nephrogram; venogram; excretory urogram.

By means of arteriogram diameter and contours of the aorta, main trunks and branches of renal arteries are defined, anomalies, dilatations, constrictions and zones with decreased vascularization are revealed. Nephrogram gives an idea about form and topography of kidneys.

In all cases, data obtained from both sides should be compared. This makes easier assessment of results, especially in unilateral pathology.

Renal arteriography is a complicated investigation, that is why it is performed only by strict indications, when suspecting renal tumor or that of adrenal gland, arterial hypertension, intricate anomalies of kidneys and renal vessels.

Contraindications: sharply marked atherosclerosis of the aorta and femoral artery; increased sensitivity to iodine-containing substances; active phase of pulmonary tuberculosis; decompensated insufficiency of blood circulation; expressed insufficiency of renal functions and those of the liver.

Complications: thrombosis and spasm of femoral artery. Embolism, pain in the extremities, traumatic aneurism of femoral artery, etc.

Renal cystography is used to reveal solitary renal cyst by means of transcutaneous puncture and filling of it with roentgen-contrast substance. Procedure is the same as in case of antegrade pyelography.

Site of puncture, depth and angle of injection of needle is précised by means of ultrasonic scanning. Contents of cyst is evacuated, along the needle roentgen-

contrast substance (urotrast, verografin, etc.) is introduced, volume being equal that of removed fluid. Pictures are made; having obtained cystogram, roentgen-contrast substance is evacuated. Antibiotics or tannins (96 % ethanol) are injected into cyst cavity.

Cystography is a method of investigation of urinary bladder, carried out after filling it with roentgen-contrast substance. Together with excretory urography, cystography is the most prevalent method of examination of urogenital system.

Indications. The necessity of defining urinary bladder configuration, its anomalies, revealing of fistulas, diverticuli, tumors, foreign bodies and roentgen-negative calculi, ureterocele, bladder-renal refluxes, benign hyperplasia of prevesical gland, contracture of urinary bladder neck.

Contraindications. At presence of bladder-urethral reflux, usage of barium suspension is contraindicated. In case of macrohematuria, usage of gaseous roentgen-contrast substances should be avoided. The latter contraindications to cystography are the same as for other instrumental methods of intervention.

Complications. Complications may be linked with reaction to introduction of urethral catheter, bladder distention with roentgen-contrast substance, bladder-urethral reflux (acute pyelonephritis).

10-20% three-iodine-containing contrast substances, 10-15 % suspension of barium sulphate, oxygen or carbon dioxide gas are used for contrasting.

Descending (in case of excretory urography) and ascending (retrograde) cystography are distinguished.

Patient is in supine position on the table for X-ray. Urinary bladder is emptied (either physiologically or by means of catheter). In case of ascending cystography roentgen-contrast substance, warmed to body temperature is introduced through a catheter in the volume, which equals that of urinary bladder.

Catheter is removed and images are made in anterior-posterior and semilateral positions. Carrying out cystography, urinary bladder is emptied.

Cystography makes it possible to define sizes, form (mega-ureter, small urinary bladder, etc.), contours (undulating character in expressed trabecularity, protrusions in diverticulum, defect in case of neoplasm, impressions in squeezing in case of inflammatory or tumor process of the bordering organ) of urinary bladder. In case of insufficient function of internal sphincter, filling defect in posterior urethral part may be revealed.

In **descending cystography** (it is performed 40-60 minutes after excretory urography) image of bladder contours of is less distinct.

This investigation is especially valuable in such cases, when due to some reasons (bladder stricture, acute prostatitis, urethritis, etc.) it is impossible to introduce catheter into urinary bladder.

Retrograde cystography in infants and children of pre-school age is performed under narcosis.

Urinary bladder is emptied by means of elastic catheter (for catheterization of newborn boys ureteral catheter may be used) and is filled with roentgen-contrast substance. Children under 2 years of age are introduced 50 ml, 5-7 years of age - 80-100, over 7 years of age – 100-150 ml.

Catheter is removed and images in three projections are made – in anterior-posterior, semi-lateral and axial.

In the norm urinary bladder in children is pear-shaped with distinct contours. By means of retrograde cystography it is possible to reveal calculi, foreign bodies, tumors, sometimes – ureterocele, tuberculosis lesions of bladder, etc.

In case of bladder diverticulum, X-ray picture is very characteristic: near urinary bladder additional cavity is seen.

Neurogenic bladder is often enlarged (tower-like). Weakness of sphincters of urinary bladder is revealed in the form of tongue-like throwing out of roentgen-contrast substance into posterior part of urethra (Fronstein's syndrome).

Retrograde cystography is one of the basic methods of diagnostics of urinary bladder traumas. In these cases roentgen-contrast substance oversteps bladder limits.

By images made after urinary bladder has been emptied on one's own, residual urine is revealed.

While carrying out **pneumocystography,** except for roentgen-contrast substance oxygen is introduced into urinary bladder. This procedure is performed not only by means of urethral catheter, but by mean of supra-pubic drainage, or by means of supra-pubic puncture as well.

Cystography is of great significance for diagnostics of vesico-ureteral reflux. At state of rest, passive vesico-ureteral reflux may be revealed. Especially often this is observed on postponed cystograms, when images are made every 30 minutes during 3 hours.

Mixed cystography, which is performed at rest state just after urination is even of more diagnostic value.

While investigating by means of this method, during urination act intravesical pressure grows sharply and in case of weakness of closing apparatus of urethra orifice roentgen-contrast substance penetrates into urethra and even into renal pelvis – active reflux. During mixed cystography practically the whole urinary system is investigated (from kidneys to urethra), the image must be made on the film of a big size, all portions including.

With the help of mixed cystography valuable information about state of the bladder neck and that of urethra may be obtained. These portions due to their localization in case of their lesion unfavorably impact portions of urinary ways, located higher.

Within the norm on mixed cystogram funnel-like transition of bladder into urethra is observed. In case of contracture of bladder neck in children plane of its lower segment is seen. In this case roentgen-contrast substance passes through bladder-urethral segment by a thin stream.

In presence of urethral valves, hypertrophy of seminal tubercle, on cystogram there is dilatation of urethra over the place of obstacle, sometimes it is lower (post-stenotic dilatation).

Suspecting infiltrative growth of urinary bladder tumor, to define elasticity of its wall, roentgenograms are made on the same film in different stages of filling of urinary bladder – *polycystography.* Elastic catheter is introduced into urinary bladder, and by dribble portions roentgen-contrast substance is introduced. After each portion image is made. On this image corresponding quantity of concentric contours is revealed. In the place of invasion of urinary bladder wall with tumor due to its rigidity, only one contour appears.

Retrograde ureteropyelography. X-ray investigation which is performed by means of filling in of pelvic-caliceal system and of the urethra with roentgen-contrast substance in the direction against flow of urine, that is retrograde. Roentgen-contrast substance is introduced by means of ureteral catheter, introduced either into urethra or renal pelvis in cystoscopy. In the recent years due to extending possibilities of excretory urography and introduction into clinical practice of angiography, puncture transcutaneous antegrade pyelography, computed tomography, indications to retrograde pyelography significantly narrowed. At the same time obtained experience showed, that retrograde pyelography may cause serious complications.

Indications. At present time retrograde pyelography is used only in those cases, when other methods of investigations do not clear up diagnosis in full, especially if excretory urography does not give expressive image of pelvi-caliceal system and of the urethra due to a sharp decrease of renal function.

Contraindications. Acute inflammatory diseases of urinary tract and male genital organs, obstacles along the route of low urinary ways (benign hyperplasia of prevesical gland, urethral stricture, etc.).

Complications. Attack of acute pyelonephritis in the kidney under investigation, which may cause more severe complications such as bacteriemic shock and urosepsis are the most often complication of retrograde uretero-pyelography. Increase of intra-pelvic pressure and development of caliceal-renal refluxes in the kidney, affected by carcinoma, threaten with dissemination of tumor cells with blood flow. Careful, slow introduction of roentgen-contrast substance in small quantities (3-5 ml) to avoid refluxes development is of main significance in prevention of complications of retrograde pyelography. In modern conditions presence of electro-optical transducer and roentgen-television device makes it possible to avoid reflux development and mentioned-above complications.

Pneumopyelography. It is modification of retrograde ureteropyelography, while performing it gas is used as contrast substance. This procedure is used in diagnosing of roentgen-negative stones. On the background of gas in cavitary system of kidney or urethra, roentgen-negative stone is seen as defect.

Antegrade pyeloureterography. It is a procedure of roentgenologic investigation, based on direct introduction of roentgen-contrast substance into caliceal-pelvic system of kidney or by means of its transcutaneous puncture, or through nephrostomic drainage, set up by operative means. Indications to this method of investigation are those cases, when contrast substance is not seen on excretory urograms due to disorder of renal function, and it is impossible to perform retrograde pyelography (small capacity of urinary bladder, obstruction of

urethra or ureter). Water-soluble, iodine-containing agents or gas may be used as contrast substances. Antegrade pyelography with introduction of contrast substance is not complicated, but it

Ureterography. This investigation may be descending (mixed) and retrograde.

Indications**.** Damage or disease of the urethra.

Contraindications. Acute diseases of the urethra.

Complications. Urethral refluxes, urethral fever, urethrorrhage.

Computed tomography (CT). Up to date roentgenologic investigation. In diagnostics is above all known methods. Investigation is performed by means of roentgen beam with narrow focus, directed through the object, and is registered by roentgen detectors. Computer processes the obtained information and it is produced on the screen in the form of image. These images make up «Pirogov's sections (scans)». Minimal distance between sections is 4 mm. Processing of the obtained sections by computer makes it possible to create two- and three-dimensional reformats. Up to date spiral computer tomographic scanners make it possible to recognize objects with diameter of 2-3 mm; these scanners far exceed ultrasonic ones in accuracy (the latter «see» object, beginning with 4 mm). Computed tomography gained the widest occurrence in urology and is the most informative method of investigation.

Indications. Practically all diseases of urogenital organs, which have signs of organic lesion. By the data of European standards of examination, this method of investigation is final and is entitled as pivotal one.

Contraindications. Pregnancy, psycho-emotional excitation, claustrophobia.

Complications. Not revealed.

Magnetic resonance tomography (MRT). Basis of this method is monoatomic hydrogen. By means of a strong magnetic field «excited» atoms of hydrogen may be registered. As atoms return into state of equilibrium (magnet relaxation) each tissue makes it characteristically for each type. The latter is important determinants of contrast image and intensity of signal. By means of computer processing of the obtained signals, on monitor screen a real image of the tissues under investigation appears.

In urologic practice MRT is used to diagnose tumor processes in urogenital organs. MRT makes it possible to obtain information about state of the great vessels of each organ with great accuracy; this is of special importance in defining stage of development of tumor process. This method is especially indicated in diagnosing of volume formations of kidneys in patients with renal insufficiency, administration of roentgen-contrast iodine-containing agents is contraindicated to them. MRT is an expensive investigation, so, nowadays not less informative but cheaper methods such as USI and CT are used more widely.

Indications. Organic lesions of urogenital organs, architectonics of great bloodstream and stage of its lesion.

Contraindications. Psycho-emotional excitation, claustrophobia.

Complications. Not revealed.

Radionuclide (radio-isotope) methods of investigation.

Radionuclide renography – obtaining of graphic image of dynamics of accumulation and excretion of radio-pharmaceutical agent by each kidney. As an isotope, gipuran iodine-131 or iodine-125 is used. In recent years technecium-99 enjoys big popularity. Therewith dose of radiation is extremely low for organism. This method gives mathematically precise information about functional state of each kidney. Radio-isotope renography may be used in emergent and pediatric urology. Special preparation for this investigation is not required.

Radionuclide scanning of kidneys (nephroscintigraphy). To reveal anatomical changes in kidneys method of radionuclide scanning and scintigraphy is used. Scanning is performed with movable detector. Scintigraphy is performed by means of reading out unmovable gamma-camera.

Scanning of kidneys – method of graphic image of renal parenchyma. For this method labeled Hg - 197 or Hg - 203 (promeran) is used. Scanning makes it possible to reveal number of functionally competent nephrons.

Indications. Tumor processes in the kidney, anomalies of kidneys.

Contraindications. Expressed renal insufficiency.

Complications. Not defined.

Dynamic computed scintigraphy. Method is based on the investigation of functional state of kidneys by means of registration of active accumulation of radionuclide by renal parenchyma. Iodine-131 (gipuran) or iodine-125 (promeran) and mercury-197 are used. Possibilities of computed gamma-scintigraphy are so wide, that they allow to notice 5% difference in the renal function.

Indications. Anomalies of kidneys. Renal tumors and cysts.

Contraindications. Not revealed.

Complications. Not defined.

Scintigraphy of parathyroid glands. It is used in patients with coral and relapsing nephrolithiasis to reveal primary hyperparathyroidism.

Scintigraphy of adrenal glands. This procedure is used in diagnostics of tumors of adrenal glands, when USI and CT are powerless.

Scintigraphy of testes. Method makes it possible to define location of testis, its sizes and functional competence. It is used in diagnostics of cryptorchidism.

Scintigraphy of skeletal bones. Radionuclide diagnostics used for revealing of metastases in the osseous structures. This method is of particular necessity in cases of prostate gland cancer. In the recent years by the help of isotopes it became possible to block development of these metastases.

Structural-logical scheme of the lesson content:

Roentgenologic (X-ray) and radioisotope methods of investigation

3)

Educational elements		
I order	II order	III order
Roentgenologic anatomy of kidneys	1) level of location; 2) angle between longitudinal axes of kidneys; 3) sizes of kidneys; 4) physiologic mobility	
Plane urography	1) shadows (contours) of kidneys in the norm; 2) significance of line of lumbar muscle; 3) shadows, which simulate calculi	1) phleboliths; 2) fibromatous uterine nodes; 3) calcified lymphatic glands
Excretory urography	1) indications; 2) roentgen-contrast preparations and their dosages; 3) procedure of their usage; 4) modifications; 5) contraindications	1) orthostatic urography; 2) compressive urography; 3) infusion urography with postponed films; 4) urography on breathe in/ on breathe out
Retrograde uretero-pyelography	1) indications; 2) amount of contrast substance for pyelography; 3) procedure of performing; 4) contraindications	

Cystography	1) descending cystography; 2) ascending cystography	1) with thin contrast substance; 2) pneumocystography; 3) with combined contrast study; 4) residual;
Urethrography	1) indications; 2) descending (mixed); 3) ascending	

Questions to check up knowledge.

1) Preparation of patient for roentgenologic investigation.
2) Plane urography.
3) Contrast substances, used in urologic practice.
4) Ways of administration of contrast substances.
5) Methods of roentgenologic investigation of urologic patients.
6) Peculiarities of introduction of contrast substance into renal pelvis during retro(ante)grade urography.
7) Comparison of diagnostic value of USI, CT and MRT.
8) Radioisotope diagnostics in urologic practice.

Tasks for practical work

(manikin)

№	Tasks	Directions for task	Notes
1.	To master method of excretory urography	Test for sensitivity to contrast agent.	To pay special attention to the data of investigations
2.	To master method of ascendingy urography	Amount of contrast substance which is introduced into urinary bladder	

Situation tasks, III level.

1. Female patient, 35-years-old was admitted to the hospital presenting complaints on colic-like pain in the lumbar area in the right. Pain is accompanied by nausea, vomiting, frequent urges to void urine. Objectively: general state is of moderate severity. On deep palpation tenderness in the area of the right kidney is felt. Pasternatsky's symptom is positive in the right.

On plain urogram at the level of IV lumbar vertebra in the right, shadow with suspicion of calculus, of oval form, sizes 0,8 by 0,6 cm was revealed. What accessory roentgenologic investigations should be used?

2. Male patient, 58-year-old was admitted to the clinic with complaints on frequent urination, macrohematuria. Has been ill for 4 months. Objectively: abdomen is soft, painless, kidneys are not palpable, Pasternatsky's symptom is negative. Prevesical gland is not enlarged, with smooth surface, painless. During hospital stay, total macrohematuria with shapeless blood clots was observed twice. Due to this fact cystoscopy was made: on the lateral wall of urinary bladder rough villous tumor, sizes 2 by 3 cm on a wide basis was revealed. Left orifice is not defined, right one is without changes. What investigation is necessary to carry out to make correct diagnosis, to define state of upper urinary tract?

ORIENTED CARD FOR INDEPENDENT WORK WITH LITERATURE.

	Roentgenologic (X-ray) and radioisotope methods of investigation	
Plain urography	1) contours and sizes of kidneys, their topical skeleton; 2) angle between axes of kidneys; 3) contours of lumbar muscles; 4) structure of	

Excretory urography	1) procedure of carrying out. 2) first medical care in complications; 3) nephrogram; 4) structure of big and small calices, of renal pelvis; 5) ureters; 6) urinary bladder	30% solution of sodium thiosulfate, 10-20 ml in the vein and antihistamines
Retrograde cystography	1) procedure of bladder catheterization; 2) introduction of contrast substance; 3) pneumocystography; 4) mixed cystourethrography; 5) presence or absence of cystic-ureteral refluxes; 6) residual cystography	
Retrograde ureteropyel ography	1) deformation of pelvi-caliceal system; 2) filling defect; 3) urinary stones, roentgen-negative as well	
Renal angiography	1) procedure of carrying out; 2) indications; 3) interpretation of phases of circulation of roentgen-contrast agent	1) renal tumors; 2) nephrogenic hypertension; 3) angio-architectonics before surgical intervention Phases: 1) arterial; 2)nephrographic; 3)venous; 4) excretory; 5)parenchymatous

Renal phlebography and venocavography	1) stenosis of renal nein; 2) squeezing of vena cava by tumor or metastases; 3) tumor thrombus in veins	
Radioisotope rheography	To find vascular, secretory and excretory segments of renogram, to give their assessment	

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Module# 1

Thematic module #2

Theme of the lesson Urolithiasis.

Topicality of the theme.

Urolithiasis is 30-45% of all urological diseases. The process is duplex almost in every 8-10th patient. The wide spread and frequent recurrences underline the topicality of the problem of early diagnosis, treatment and prevention of urolithiasis.

Purpose of the lesson.

The purpose of the lesson is to learn the issues of etiopathogenesis, symptomatology, diagnosis and treatment of urolithiasis to carry out differential diagnosis of acute surgical diseases of the abdominal cavity, providing first medical aid in emergency conditions (renal colic, anuria, hematuria) and for timely direction of patient to the doctor –urologist in necessary cases.

A student must know:

- Causes of urolithiasis appearance.
- Classification of the urinary stones by chemical composition
-Clinical manifestations of urolithiasis
-Diagnosic methods of urolithiasis.
- Principles of urolithiasis treatment.

A student must be able to:

- Make an adequate plan of investigations, state a sequence of additional means of diagnosis (lecture material, textbooks).
- Determine the level of disturbance of kidney function and complications in urolithiasis (lecture material, textbooks, patients).
- Make a plan of urolithiasis treatment (conservative, surgical, instrumental) (lecture material, textbooks).

Practical skills appointed to the practical lesson:

- carry out differential diagnosis of renal colic with acute surgical diseases

Intersubject integration

#	Subject	You should know: clinical picture, aethiology, pathogenesis	You should be able to
1	Therapy	Lower lobe pneumonia	Make differential diagnosis between listed diseases and urolithiasis Interpret all methods of examination properly: - laboratory; - roentgenologic; - radioisotopic; - ultrasound and others
2	Surgery	Acute cholecystitis Pancreatitis Appendicitis Ulcer, perforated ulcer, intestinal obstruction, intestinal neoplasms	
3	Gynecology	acute adnexitis - suppurating ovarian cyst - extrauterine pregnancy	
4	Inflammatory diseases	- typhus - malaria - leptospirosis - enteritis (colitis, enterocolitis)	
5	Phthisiology	- acute pulmonary tuberculosis, - renal tuberculosis	

Content of the lesson

Urolithiasis is 30-45% of all urological diseases. It is one of the widespread diseases and it is the second after inflammatory diseases of urogenital system. Urolithiasis is polyetiologic. It is caused by congenital anomalies, climatic conditions, deficiency of vitamins and microelements, hormonal disorders, inflammatory processes and so on.

Pain (dull pain, nagging pain or renal colic), hematuria, discharge of sand and stones are main symptoms of urolithiasis in the past history. Pyuria and dysuria are observed rarely.

In 20-25% of cases urolithiasis has active course and can simulate various diseases, including acute lesions of the abdomen (acute appendicitis, cholecystitis, pancreatitis, ileus, rupture of gastric ulcer and duodenal ulcer).

USE, chromocyctoscopy and computed tomography play an important role in differential diagnosis of acute diseases of abdominal cavity.

Ultrasound scanning of kidneys, ureters and bladder plays an important role in diagnosis of urolithiasis. We can determine acoustic characteristics of the stone with echo scanning.

X-ray examination gives important information of urolithiasis diagnosis. It should be started with plain urography. Shadows of concrements are revealed on the film except X-ray negative stones that consisted of uric acid – urate, cystine stones and protein stones.

The diagnose is made completely after introducing of radiopaque substance (excretory urography). Computed tomography gives the most accurate information about size, position and density of the stone.

Radionuclide methods are used to determine the morphological and functional disorders of the kidney. In urolithiasis, they do not provide information about stone itself, but one can determine the degree of damage of the kidney parenchyma and disturbance of urinary tract patency with their data.

There are some complications of urolithiasis:

- acute and chronic pyelonephritis (secondary, calculous);
- secondary hydronephrosis;
- fatty degeneration of kidney;
- nephrogenic hypertension;
- acute renal failure (calculous anuria),
- chronic renal failure.

In case of renal colic attack first of all pain should be eliminated. Warm bath or cold (irrigation of lumbar area with chloroethyl), antispasmodics introduction, novocaine blockade of the spermatic cord in men, and place of attachment of the round ligament of the uterus to the abdominal wall in women are used for it. Catheterization of ureter is administered in cases when mentioned methods are ineffective.

Independent discharge of stones is possible when stones smaller are than 1 cm. "Water shots", diuretic and antispasmodic drugs help it. Indications for removal of stones are the following:

- complications of urolithiasis;
- recurrent total macrohematuria;
- pains depriving the patient of efficiency;
- size of a stone is more than 1 cm.

Methods of stones removal:

- remote shock- wave lithotripsy;
- endourological removal (contact lithotripsy and lithoextraction);
- open surgery;
- Litholysis: (ascending, descending).

Structural - logical scheme of the theme content

Learning elements		
The first order	The second order	The third order
Rate prevalence		
Aethiology	Congenital abnormalities, creating stasis of urine	Anatomical defects of the urinary tracts development, neurogenic diseases of urinary tract Congenital tubulopathies (fermentopathies) Inherited nephrosis-like and nephritis-like syndromes
Pathogenetic factors	Exogenous:	Climatic and geographic factors: а)dry hot climate; б) limited drinking regimen; в) iodine deficiency in the environment, natureof nutrition; г) excessive amount of ergocalciferol in the body
	Endogenous general:	Disturbance of liver function and alimentary canal: а) latent and manifest hepatopathies; б)hepatogenic gastritis ; в)colitis and other diseases. Diseases of endocrine glands: а) hyperparathyroidism; б) hyperthyrosis; в) hypo pituitary diseases. Diseases of bones, joints, chronical damage of internal organs etc.
	Endogenous local:	Chronic inflammatory process in kidneys Disturbance of urodynamics
Pathogenesis	Theory of organic matrix Colloid-crystalloid theory	
Mineral composition of stones	Urate, oxalate, phosphate, carbonate, cystine stone, cholesterol, coral calculus stone	

Symptomatology	Pain in lumbar area: Hematuria Discharge of salts and stones with urine Dyspeptic manifestations Pyuria	
Diagnostics	Data of medical history, physical examination, laboratory, radiological and radionuclide studies, ultrasound examination. Chromocystoscopy Biochemical investigation of blood and urine on stone-forming substances	Plain urogram Excretory urography retrograde urethropyelography antegrade pyeloureterography Computed tomography
Copmlications	Acute and chronic pyelonephritis. Pyonephrosis. Hydronephrosis Nephrogenic hypertension Acute kidney failure (AKF), Chronic kidney failure(CKF).	
Treatment	Conservative Surgical Instrumental	Drug therapy Sanatorium-and-spa treatment Dietotherapy Open surgeries Pyelolithotomy Calicolithotomy Nephrolithotomy Ureterolithotomy Pyelonephrolithotomy Percutaneous ultrasound lithotripsy Distant shock-wave lithotripsy. Contact lithotripsy.

Urolithiasis

.	**Main stage.** 1. Forming of professional skills and abilities 2. To perform supervision of the patient with urolithiasis 3.To carry out an objective investigation 4.To estimate examination data. 5.To make a diagnose. 6. To carry out differential diagnostics with acute appendicitis, cholecystitis, pancreatitis, extrauterine pregnancy etc. 7.To determine the scheme of treatment of patients with urolithiasis. 8.Methods of surgical procedures.	III	Professional training in performing of supervision of the patient: examination, data analysis, differential diagnostics, determining of treatment plan Practical training in consolidating of palpation skills, urograms reading, catheterization, chromocystoscopy Solving of non-typical tasks on diagnostics, differential diagnostics and treatment of the patients with urolithiasis	Patients, a map or an algorithm of supervision of a patient Analysis. Instruments. Tasks of the third level	45 min

3.	**Final stage.** 1. Control and correction of professional skills and abilities level 2. Summing up of the lessons (theoretical, practical and organizational) 3.Home task	III	Analysis of results of patients supervision Solving of non-typical situational tasks. Individual control of practical skills	Results of supervision of patients Non-typical situational tasks, tests of the third level. Approximate map of student independent work with sources	15 min 7 min 3 min

Theoretical questions to the lesson.

1. Significance of climatic and dietary factors in urinary stones forming.
2. Hyperparathyroidism as a factor of urolithiasis.
3. Role of pyelonephritis in stone forming.
4. Characteristics of urinary stones by chemical composition.
5. Main symptoms of urolithiasis.
6. Role of USE and chromocystoscopy in diagnostics of urolithiasis.
7. Means of diagnostics of X-ray negative stone.
8. "False" stones of urinary system and means of their revealing.
9. List factors and the most typical symptoms of renal colic, differential diagnose stages of aid.
10. Complications of urolithiasis.
11. Main methods of diagnostics of bladder stones.
12. Clinical nutrition of the patients with urolithiasis depending on chemical compositions of stones.
13. Therapy, aimed at the independent discharge of stones
14. Indications for surgical procedure.
15. Lithotripsy, endourological removal of stones.
16. Litholysis.

Test control L = 2

Tasks (L = II)

#	Levels of mastering	Test of progress	
		Questions or tasks	Model of solving
1.	II	Microhematuria is a frequent symptom in urolithiasis	Yes
2.	II	Indicate aetiological factors of urolithiasis: 1. Disturbance of parathyroid glands activity 2. Infection 3. Supercooling 4. Age 5. Tubulopathies	1,2,3,5
3.	III	Clinical symptoms of urolithiasis: a, b, c:	a-pain; b-hematuria; c-disorder of urinary excretion
4	III	Describe clinical picture of renal colic: a, b, c, d:	a) intensive pains in lumbar area; b) irradiation to the external genitalia; c) dysuria is frequent and painful urination; d) macrohematuria and microhematuria
	II	Typical tasks: The stone of 2x2 cm was revealed in pelvis of the right kidney in a 40-year-old male patient after X-ray urological examination. The disease is accompanied by frequent hematuria, renal colic attacks, periodical exacerbations of pyelonephritis; function of the right kidney is reduced.	a) operation; *b) pyelolithotomy; c) nephrolithotomy; d) nephrostomy; e) resection of the kidney; f) nephrectomy

Structure of the lesson

Tasks	Approximate base of actions	Self control
Questioning	Complaints Medical history	Localization and nature of pain, time of its appearance; how did it appear, localization, irradiation, what is the pain accompanied by. Nature of urination. Amount of urine. Changes of urine colour. Time of the appearance of the first symptoms, peculiarities of its development. Discharge of sand or stones earlier, their chemical composition. Results of previous urinalysis. Performed operations. Nature and effectiveness of previous treatment. The presence of the patient's risk factors for urolithiasis. The presence of urolithiasis in relatives.
Objective examinations	General patient's condition. Condition of skin and subcutaneous cellular tissue. Examination of lumbar area. Palpation of kidneys. Pasternatsky symptom	
Data of laboratory tests.	General analysis of blood General urinalysis Biochemical investigations	Amount of leucocytes, leukogram, amount of erythrocytes, hemoglobin, ESR pH of urine, protein, erythrocites, leucocytes and salts of urinary sediment Urea, creatinine of serum, calcium, phosphorus, magnesium, uric acid, sugar of blood and urine

Results of additional diagnostic methods	X-ray, USE, cystoscopy, chromocystoscopy	Plain urogram Excretory urogram Retrograde ureteropyelography Cystography The presence of ultrasound track Indications,results
Establishing of previous diagnose	Indicate in written form what symptoms and syndromes examined patient had, suggested diagnosis	Basic. Complications. Concomitant diseases
Plan of treatment	Surgical treatment. Endourological treatment Instrumental treatment Conservative therapy Nephrectomy	Indications Technique of performing Administration of pharmacological preparations

Situational tasks of the third level L

1. A 37-year-old male patient was hospitalized to the clinic with pains in the right iliac area, dysuric disorders, and moderate abdominal distension. He had appendectomy two months ago. The diagnose of appendicitis was not confirmed. Microhematuria was revealed in examination of urine. The patient has correct body build, satisfactory nutrition, there is postoperative scar in the right iliac area, and there are pains in the same place on palpation.

What methods of extra examination are necessary to make a final diagnose?

The model of solving.

General analysis of blood
Plain and excretory urography with previous chromocystoscopy.

USE.

CT – if it is necessary.

Non-typical task.

2. A 40-year-old patient was brought to the clinic with pains in the left lumbar area. Pain is cramping. Macrohematuria is revealed in urine examination. The patient has a correct body build in objective study. Tenderness in the left kidney area is revealed on palpation. Pasternatsky symptom is sharp positive in the left. Cavity system in the left and initial part of the ureter is dilated in USE. Concrements in the kidney and upper third of ureter were not revealed.

What methods of extra examination are necessary to make a final diagnose?

The model of solving.

1. General analysis of blood.
2. Plain and excretory urography, excretory urography with delayed image.

Approximate map for independent work with sources.

#	Tasks	Indications to the tasks	Independent student notes
1.	Causes of urolithiasis	Write main aetiological factors that can cause urolithiasis	
2.	Clinical picture of renal colic	Name typical signs of renal colic	
3.	Diagnostics of urolithiasis	List main diagnostic stages on examination of the patients with urolithiasis. State what method of special urological examination is important in diagnostics of urolithiasis	

4.	Complications of urolithiasis	List possible complications of urolithiasis	
5.	Treatment of acute and chronic calculous pyelonephritis.	Name the differences in therapeutic approach of acute and chronic pyelonephritis in presence of nephrourolithias.	
6.	Treatment of urolithiasis	List the conservative methods of treatment of urolithiasis. List typical operations performed in presence of urolithiasis	
7.	Differential diagnostics of renal colic (nephrourolithias)	Name the diseases of the abdominal cavity organs that may stimulate renal colic (nephrourolithias)	

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Module № 1

Thematic module № 1

The theme of the lesson: Instrumentational, endoscopy, ultrasound diagnostic techniques in urology.

Actuallity of the theme

One of the main places in daily urological practice is the instrumental and endovesical inspections of the urinary tract. The instrumental methods sometimes complete the diagnostics of many urological diseases. Ultrasound techniques have taken a leading role in the diagnostics and treatment of urological diseases.

Educational aims.

Learn the basic ways of instrumental, endoscopic and ultrasound examination of the patients. Explain the role of these methods in the diagnostics and treatment.

The student must know:

1.the main types of urological instruments.

2. The rules of usage of the urological instruments.

3. Indications and contraindications of the instrumental inspections.

4. The place of cystoscopy in ascertainment of factors of dysuria, hematuria.

5. The value of catheterization of ureter, kidney bowls in renal colic

and treatment of acute pyelonephritis.

6. The place of ultrasound in the diagnostics of urological diseases.

7. The use of ultrasound for biopsy, conducting the endourologicalinterventions

The student must be able to:

1. prepare theinstruments for use (examples of instruments).

2. To carry out the bladder catheterization (on a mannequin).

3. Explain the cystoscopical pictures (atlas).

4. Interpret the data of ultrasound of the kidney, the bladder, the prostate (set of X-ray images).

Interdisciplinary integration.

Courses	To Know	Ability
Previous: Anatomy Physiology Pathological anatomy Radiation diagnostics	Anatomy of the kidney, pelvic anatomy,male genitals. Physiology of the kidney, the bladder, the act of urination. Methods of ultrasonic examination	Will be able to interpret the data of ultrasound of the kidney, the bladder, prostate
Intra- subject integration	Placing uretroscopes, cystoscope: plain, operational, ultrasonic in urology	will be able to distinguish endoscopes for their appointment

Contents of the lesson

Instrumental methods and ultrasound examinations as usually concludes diagnosis of many urological diseases. These methods are used in the majority of upper and lower parts of urinary tract.

Cystoscopy-in tumour of the bladder determines the location andcorrelationtumor cells with ureter eyes. Cystoscopy is obligatory examination

intotal hematuria, which allows to set the place of bleeding. Biopsy of the tumor and mucosa of the bladder helps in diagnosis during cystoscopy. In the specific injures of the bladder, diverticulum, uterovesical pouch, leukoplakia, cystalgia and tumors the diagnostics is impossible without the use ofcystoscopy.

Chromocystoscopy – allow to determine the excretory function of each kidney and ureteral patency. This method is used for the differential diagnostics of the urological diseases and acute surgical pathology of the abdominal cavity.

Catheterization of the ureter is used to determine of its permeability, the level of obstruction, the drainage of the kidneybowl during ureteral patency violations and to obtain urine separetly from each kidney. Catheterization is used for retrograde ureteropielography, during the level of obstruction in ureter.

Transurethral Electroresection is used to remove the tissue of the bladder, the prostate tumor of coagulating current with a help of a metal cystorezectoscope loop. Uretheroscopy, pyeloscopy, renoscopy.

Ultrasound (sonography) is used to obtain anatomic information and as a way of visualization of the interventional procedures of kidney biopsy, prostate gland, puncture methods of temporary drainage of the upper urinary tract.

Structural and logical scheme and the content of the themes

Instrumentation, endoscopic and ultrasonic methods of diagnosis in urology

Educational elements		
I order	II order	III order
Instrumental methods of urethra examinations	Bouginage	Aim Types of bougie. Technology bouginage. Prevention of the complications

	ureteroscopy	Prevention of complications. Types of the ureteroscopy. Indications and contraindications
Instrumental ways of research of the bladder	Catheterization of the bladder. Cystoscopy	Types of catheters. Technology of the bladder catheterization. Indications. Contraindications. Types of cystoscope. Chromocystoscopy
Instrumental methods of ureters examinations	Catheterization of the ureters. Ureteroscopy	Indications. Complications. The technique\method ofexecution
Ultrasound examinations of the kidneys, ureters, the urinary bladder, prostate gland, the male genital organs	Terms of execution. Rate. Pathology	Transabdominal. Transrectal
Intervention ultrasound in urology	Methodology. Conditionsof execution	Percutaneous puncture nephrostomy. Percutaneous puncture of renal cysts.Percutaneous biopsy of the kidney, prostate, scrotum organs. Percutaneous puncture drainage of suppurative destructive processes in kidneys

Theoretical questions:

1. Catheters - types of application.
2. Bougie - types of appliation.
3. Urethroscope - types of application, indications and contraindicationsto endoscopy.
4. Cystoscope - types and application.
5. Chromocystoscopy.
6. Catheterization of ureters, technique of usage, indications and contraindications,

complications. Their prevention.

7. The use of ultrasound in urologic practice

8. Biopsy of kidney, prostate and bladder.

Tests of the III-rd level.

Control test L = II

Determine which interventions are used in the treatment of urethral stricture

a) transurethral resection;

b) cystostomy;

c) bouginage of urethra;

d) laser incision.

Correct answers: a, c, d

What will you do after the examination of the patient with gross hematuria?

1) cystoscopy;

2) plain and excretory urography;

3) computer tomography;

4) diagnositcs;

5) test of three glasses.

Correct answers:

a) 2. 4. 1. 5. 3. *b) 5. 4. 1. 2. 3. c) 1. 2. 4. 3. 5.

Professional algorithm of skills forming: bladder catheterization.

(**dummy)**

Task	Approximate action sequence	Comments Self-control
To become proficient in technique of bladder catheterization in women.	The patient lies on his back with legs bent in the hip and knee joints,her knees are moved apart, or on gynecological chair. Reservoir for collecting urine is placed between her thighs. After antiseptic treatment of the external urethral opening of the urethra and vestibule of vagina catheter is gently introduced through the urethra into the bladder. The appearance of the urine from the catheter indicates that it is contained in the cavity of the bladder.	Observe the rules of asepsis and antisepsis strictly.Follow the preservation of the catheter sterility after its removing from the package.Introduction of the catheter in the urethra should not be accompanied by violence. In the case when admixture of blood in the urine appears in the hole of the catheter, manipulation must be stopped and senior is invited.

To become proficient in technique of bladder catheterization with plastic catheter in men.	Balanus and the external opening of the urethra are treated with antiseptic solution and wipe dry. Balanus is grabbed in the sides by the middle and ring finger of left hand and slightly pull forward and up to open the folds of mucous membrane of the urethra. The region of external urethral opening is widened with thumb and forefinger of the same hand.The catheter is placed between the V and IV fingers of right hand and its proximal end, lubricated with sterile glycerine, or vaseline, is slowly introduced into the urethra with forceps.Appearance of urine indicates that the catheter is in the cavityof bladder.	Forcing of the conducting is not allowed while conductionof the catheter through the urethra into the bladder. The catheter may be held for another 2-3 cm but not more after the appearance of urine from it. In the case when admixture of blood in the urine appears in the hole of the catheter, manipulation must be stopped and senior is invited.

Situational tasks of the third level.

1. A 50-year-old female patient has been hospitalized to the clinic with complaints on presence of blood in urine, she has been ill for the first time. The stomach is soft, painless. Kidneys are not palpable. Pasternatsky symptom is negative in two sides. In plan X-ray film kidneys are in typical places, concretions in the projection of the kidneys, ureters, bladder were not revealed. On excretory urograms in 8-15 minutes caliceal and pelvic systemcontrasted on both sides, kidney function is not impaired.There is a defect of filling of 0.4 x 0,4 cm on the right side in the area of the pelvis on the top of the wall,that is why bleeding appears.What examinations should be carried out:

а)What is necessary to make a diagnose?

б) Where is bleeding from?

в) What are extra methods of examination?

Modeloftheanswer:

Cystoscopy, ultrasound, URS (ureterorenoscopy), X-ray examination of the lungs.

2.A 25-year-old female patient has been hospitalized with complaints on pain in the right iliac area, nausea, vomiting, increasing of body temperature up to37,4°C.The tongue is coated and dry. The stomach is painful in the right on palpation, kidneys are not palpable. Pasternatsky symptom is doubtful in the right. Symptoms of peritoneal irritation in the right are weakly positive; they are negative in the left.

Leukocytosis is 14,0 x 10^9mmol/l. In the analysis of urine leukocytes are 8.6 infield of view, red blood cells are single, fresh in field of view.

In ultrasound examination kidneys are in typical places, their contours are clear. Cavity system is not dilated in the right and in the left. The initial section of the ureter is visualized.

What examination should be carried out to make differential diagnosis?

Model of the answer:

Chromocyctoscopy, plan, excrectoryurography, RRG

Reference map for independent work of students with literature

№	Task	Instructions for task	Independent notes of students
1	Instruments for bouginage	Name main types of bougies, their classificationon the scale of Shrier	Roser and Guyon olive pointed bougies with steeply curved cystic end. Lefortbougieswithflexi bleconductors
2	Bladder catheterization	Write down the main types of catheters	Nelaton, Tiemann, Pomerantsev-Folie rubber catheter, Mercier flexible catheter, Pezzer's olive pointed catheter, male metal catheter, female catheter
3	Cystoscopy	Write down indications and contraindications for cystoscopy	Cystoscopy is examination of internal surface of bladder. Different pathologic changes in lumen of the organ are revealed during cystoscopy (stones, foreign bodies, inflammations, ulcers, neoplasm, entrance into diverticulum of bladder,

			ureteric duplication etc.). Contraindicationsforcystoscopy: acuteinflammatoryprocessesofureter, external genitalia and prostate gland, stricture, neoplasmofureter.
4	Chromocystoscopy	Indications for chromocystoscopy. What is the point of indicarmine test?	Chromocystoscopy allows to determine excretory function of each kidney, presence of ureter patency. This method is used for differential diagnosis of urological diseases and acute surgical pathology of abdominal cavity.
5	Ureter catheterization	Indication for ureter catheterization. What questions are solved in ureter catheterization?	Ureter catheterizationis used to determine its patency, level of obstruction. Drainage of the renal pelvis at the time of the patency of the ureter and to obtain urine from each kidney separately Introduction of radiopaque substance in cup and pelvis system for X-ray study

6	USE of kidneys	What is the point of USE?	Contours, the size of the kidneys, the presence or absence of deformation and dilatation of caliceal and pelvis system, the degree of its dilation are defined. Thickness of cortical layers and brain parenchyma in different parts. Presence or absence of concretions and space-occupying lesions. Assessment of the state of kidney and the initial sections of ureter.
7	USE of bladder	What is the point of USE?	Form, clarity of contours, the wall condition. The presence of tumor-like formations, their size, degree of invasion. Condition of terminal parts of ureters, the presence of ureterocele. The presence of diverticula, bladder stones.
8	USE of prostate gland of the scrotum organs and penis	What is the point of USE?	Size and volume, symmetry and state of capsule. Echostructure. Presenceofcysticortumour-likeformation. Destructive changes in inflammatory processes. Assessment of prevalence of fibrous

			plaque in Peyronie's disease. Doppler sonographic assessment of hemodynamics of the penis

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Module # 1

Thematic module number 1

Theme of the lesson: Acute and chronic pyelonephritis.

Topicality of the theme

Pyelonephritis is the most common kidney disease in people of different sex and age, from early childhood. Disturbance of urine outflow, hospitalization and instrumental manipulations play an important role among the etiological factors of acute and chronic pyelonephritis. Acute and chronic pyelonephritis make 2/3 of all urological diseases. The leading symptom is renal dysfunction, which can cause serious complications: the transition from serous phase into purulent, bacteriemic shock, secondary contracted kidney, renal hypertension, pyonephrosis requiring surgical treatment (nephrectomy).

Learning aims

A student must know:

- Classification of acute and chronic pyelonephritis by the course of the disease.
-Etiology and pathogenesis, clinical manifestations of acute and chronic pyelonephritis.
-Diagnostics and treatment of acute and chronic pyelonephritis.

A student must be able to:

- Analyze the causes of acute and chronic pyelonephritis (lecture materials, textbooks).
- Explain methods of clinical studies (past history, examination, and palpation), findings of laboratory methods (patients, samples of analysis).
- Make a chart of the examination and interpret the results of ultrasound, X-ray examination methods, RRG (radionuclide X-ray) (set shots).

- Analyze the peculiarities of the clinical course of acute and chronic pyelonephritis (patients, lecture materials, textbooks).

- Diagnose and make a scheme of treatment plan of general illness (patients, lecture materials, textbooks).

Practical skills consolidated by the practical lesson:

Assessment of general analysis test rates (sample analysis)

Intersubject integration

#	Subjects	To know	To be able to
1.	Therapy	Distal pleuropneuminia	Perform a differential diagnosis of the listed diseases and acute and chronic pyelonephritis, and also interpret all methods correctly – Biochemical, laboratory works. X-ray methods. Radioisotope Ultrasound Thermographic and other methods
2.	Surgery	- acute cholecystitis; - acute pancreatitis; - acute appendicitis	
3.	Gynecology	- acuteadnexitis ; - suppurating ovarian cyst	
4.	Phthisiology	- acute tuberculosis of the lungs	
5.	Infectious diseases	- malaria; - typhus; - leptospirosis	

Theme of the lesson. Contents.

Pyelonephritis isa non-specific infectious and inflammatory process observed in patients with renal and upper urinary tract disturbance. Colon bacillus, staphylococci, proteus, enterococci etc. are most often causative agents of pyelonephritis. Microorganisms can penetrate into the kidney in several ways: hematogenous, urinogenous and lymphogenous ascending way. Such general local factors as supercooling, avitaminosis, infectious disease of urinary tract, disturbance of urine outflow from the kidney play an important role in the development of inflammation in the kidney.

There are primary and secondary pyelonephritis. In the primary pyelonephritis the outflow of urine is not impaired, secondary process occurs in case of urinary stases. There are the following types of pyelonephritis by its course: 1) acute (serous, purulent), 2) chronic and 3) recurrent

Types of acute purulent pyelonephritis are the following: pertaining to apostema, carbuncle and abscess of kidney. There are three phases of the process activity in the course of chronic pyelonephritis: a) an active inflammatory process b) latent course c) remission or clinical recovery.

The main symptoms of acute pyelonephritis is pain in the lumbar area, chills, significant increase of body temperature. Increased body temperature is often repeated inpurulent forms of inflammation, temperature increasing may repeat several times a day. A variety of clinical picture which is evident by moderate pain in the lumbar area, leucocituria, bacteriuria, thirst, dry mouth etc. is typical for chronic pyelonephritis.

Diagnosis of acute serous pyelonephritis: laboratory methods play a major role; bacteriuria is revealed, the number of microorganisms in 1 ml of urine is determined; the nature of microorganisms, the presence of leucocituria, the number of active white blood cells and Sternheimer-Malbin cells are revealed.

A renal ultrasound scanning plays an important role for the diagnosis of pyelonephritis. The size, shape and contours of the kidney and the thickness of the parenchyma are determined with echo scanning. The method allows to obtain information on the dilatation ofcalyx and pelvic system in disturbance of the passage of urine.

X-ray and radionuclide methods of examination play important role in the complex of diagnostic methods of pyelonephritis.

Excretory urography allows to evaluate the anatomical state and function of the urinary tracts, it alsoreveals signs of kidney lesion, calyx and pelvic system and ureters, and controls the dynamics of pathological process.

Radionuclide methods of examination are used to determine the morphological and functional disorders of the kidney.

Thermography and thermal imaging are used as extra methods.

Scheme of treatment of patients with acute pyelonephritis depends on the nature of the process (primary or secondary), its shape (single or duplex). Obligatory condition of secondary nephritistreatment is the elimination of causes of disturbance of urine passage and blood circulation in the kidney.

Prognosis of acute primary pyelonephritis inwell-timedperformed antibiotic therapy is favorable.If the process becomes chronic,the prognosis is unfavorable. The ultimate result of chronic pyelonephritis is secondary contracted kidney, chronic renal failure, renal hypertension, pyonephrosis.

Structural and logicalscheme of theme content

Acute and chronic pyelonephritis

Educational items		
The first order	The second order	The third order
1	2	3
Contributing factors	Disturbance of urodynamic Abnormalities of renal development Instrumental manipulations	
Stages of the disease	Acute pyelonephritis	
Diagnostics	Palpation. Ultrasound examination, computer tomography, X-ray examination, Biopsy Chronic pyelonephritis	Severe, purulent , apostematous nephritis, carbuncle of the kidney, abscess of the kidney Renal necrotic papillitis Acute stage Latent stage Stage of remission
Clinical picture	Increasing of body temperature Fever Pain in lumbar area General weakness Changes in urine	

Methods of diagnosis	Clinical examination Laboratory examination (changes in urine and blood) Endoscopy X-ray examination, Ultrasound examination, Radionuclide renal scan (RRS), CT thermography Biopsy of the kidney (nephrosclerosis)	Increasingofkidney Chromocystoscopy (disturbance of urodynamics Plain, excretory urography Retrograde urethrography Increasing or decreasing of kidney in size, disturbances of kidney function Changes of kidney structure
Diagnostic signs	Disturbances of kidney function Changes of urine and blood Change of kidney structure Increasing or decreasing of kidney in size Nephrosclerosis	
Complications of acute pyelonephritis	Chronic pyelonephritis	Chronicpyelonephritis (CPN), Acutepyelonephritis (APN), nephrogenic hypertensionarterial hypertension pyonephrosis
Treatment	Surgical, conservative	Drug treatment Sanatorium and spa treatment Dietotherapy

Questions:

1. List inflammatory diseases of the kidneys.
2. Name the main etiological agents of acute and chronic pyelonephritis.
3. State the most characteristic symptoms of inflammation of the kidneys.
4. Name what ways microorganisms may geti ntot he kidney.
5. What is the difference between primary and secondary pyelonephritis.
6. Name laboratory, instrumental, radiographic and other methods of examination of acute and chronic pyelonephritis.
7. Role of USE and intravenous urography in diagnosis of acute and chronic pyelonephritis.
8. Complications of acute and chronic pyelonephritis
9. Indication for the operation.
10. What operations are used for treatment of the patients?
11. What is the plan of follow-ups of the patients with chronic pyelonephritis?

Situational tasks (L = II)

1. A 30-year-old patient complains on pain in lumbar area, the pain increases while breath in and out; there is increasing of body temperature. He has been ill for last three days.

The kidneys are not palpable and Pasternatsky symptom is doubtful in objective examination. Tough breathing is heard in auscultation. There are no pathologic changes in urine analysis and there is slight increasing of ESR in blood analysis.

а) Is it possible to diagnose acute or chronic pyelonephritis?

б) What is necessary to make a diagnose?

в) What are extra methods of examination?

The model of answer:

USE, plain excretory urography, lung examination are extra methods of examination

2. A 45–year-old female patient A. has been hospitalized with complains of pain in lumbar area; pain is more severe in the left side, there is increasing of body temperature. We know from the past history that thepatient suffers from chronic pyelonephritis and urolithiasis. Objective examination reveals soft stomach; there is moderate pain in the left hypochondrium.Kidneys are not palpable, Pasternatsky symptom is positive in the left. Urine analysis reveals leucocituria. Blood analysis reveals elevated leukocytosis and ESR.

Ultrasound examination did not reveal pathological changes in the right kidney. Cavity system extremely dilated, parenchyma is thickened, and concretions have not been revealed in the left kidney.

Dilatation of left ureter in upper third is to 0,7 cm.

Diagnosis, extra methods of examination, treatment, prognosis.

The model of the answer:

Urolithiasis, concrement of ureter. Exacerbation of chronic pyelonephritis.

Extra methods of examination:

- plain, excretory urography, renography.

Treatment:

Catheterization of the left ureter, surgical treatment, extracorporal shock-wave lithotripsy (ESWL)**,** KLT**,** conservative treatment of chronic pyelonephritis

Structure of the lesson

Task	Oriented basis of actions	Comments Self-control
Complaints and past history	Location and nature of pain Time of the appearance of the first signs of the disease, as they were defined later Amount of urine The results of the previous treatment and previous studies of urine The nature and effectiveness	
	Treatment. The presence of the patient's risk factors for acute and chronic pyelonephritis	
Objective examination	**You must estimate** the state of the patient. **You must make** palpation of the patient's stomach in lying position, on the sideand in standing position	Pulse, AP (arterial pressure),BR (breathing rate). The enlarged, moderately painful kidney may be palpated
Laboratory examination findings	Complete blood count Complete urinalysis The number of active white blood cells and Sternheimer-Malbin cells, tests by Nechiporenko, Ambourget, Addis Kakovsky. Microbial number.	Number of white blood cells, Leukogram, number of erythrocytes, hemoglobin, ESR. PH of urine, protein, erythrocytes, leukocytes
Findings of extra diagnostic methods	X-ray examination, ultrasound examination, CT, magnetic resonance image (MR-image), thermography, biopsy	Plain urography Excretory urography Sizes, formsand contours of the kidney, structure and thickness of the parenchyma

Determining of the diagnose	Make a diagnose of the main disease, its complications, accompanying pathology.	
Choice of therapeutic approach	Conservative Surgical	Drug treatment, sanatorium-and-spa treatment, dietotherapy Decapsulation of kidney Partial nephrectomy Ureteric catheterization, catheter and stent inserting, percutaneous nephrotomy

Situational tasks L = of the third (III)level.

1. A 25-year-old female patient has been hospitalized to the clinic. She has got pain in lumbar area; the pain is more severe in the right; there is temperature increasing 37,5°C. Stomach is soft, painless in objective study. Low pole of the right kidney is palpated in horizontal and vertical position, Pasternatsky symptom is positive in the right. Urine analysis reveals leucocituria. Blood analysis reveals insignificant elevation of white blood cells level and ESR. There is insignificant dilatation of cavity system of the right kidney.

Models of solving.

You may think of right - side nephroptosis. Secondary acute right - side pyelonephritis. It is necessary to make plain and excretory urogram in horizontal and vertical position of the patient to confirm the diagnosis. Treatment is conservative, surgical treatment is fixation of the kidney (nephropexy).

2. A 55-year-old female patient has been hospitalized to the clinic with pain in lumbar area in the right side. The past history contains information that she has

been suffering from right-side pyelonephritisfor 15 years. She has also had hypertension for last 3 years.

Objective study revealed soft, painless stomach. Kidneys are not palpable, Pasternatsky symptom is badly positive in the right. Decreasing of the right kidney in size is noted in ultrasound examination. Urinalysis revealed insignificant number of leucocytes; blood analysis is without any pathology.

Models of solving.

Based on the conditions of the problem the patient has chronic pyelonephritis. There is secondary contracted kidney, renal hypertension. For further diagnosis it is necessary to make excretory urography, PP, if there is not function of the right kidney. Treatment is surgical (nephrectomy on the right).

30. A 60-year-old male patient complains of pain in lumbar area, increasing of body temperature to 38°C, fever. Objective study revealed pale cutaneous coverings. In palpation there is tenderness and muscle tension in the right hypochondrium and tumourous movable formation is also palpable in the right hypochondrium, Pasternatsky symptom is badly positive in the right.

Symptoms	Increasing of body temperature and pain in lumbar area						
	Lower partial pneumonia	Acute cholecystitis	Pancreatitis	Paranephritis	Infectious diseases	Urolithiasis	Pyelonephritis
Changes in urine	-	-	-	-	-	+	+
Changes in blood	+	+	+	+	+	+	+
USE	-	-	-	+	-	+	+
RRG	-	-	-	+	-	+	+
Excretory urography	-	-	-	-	-	+	+
Biochemistry of blood (urea, cratinine)							+
Thermography	+	-	-	+	-	+	+

Test the differential diagnosis (L - III)				
Symptoms of disease	Urinary kidney	Glomeruloneph ritis	Renal colic	Acute pyelonephritis
Fever	+	-	-	+
Increasing of body temperature	+	-	-	+
Painin lumbar area	+	+	+	+
Nausea, vomiting	-	-	+	+
Hematuria	+	+	+	+
Anuria		-	+	-
Absence of appetite	+	+	+	+
Loss of weight	+	+	-	+
Changes in kidney structure in USE	+	+	-	+
Disturbance of urodynamics	-	-	+	+
The presence of active leucocytes in urine				+

Answer: acute right side pyelonephritis

Reference map for the independent student work with literature.

Acute and chronic pyelonephritis.

#	Task	Instruction to the task	Independent work
1.	Review topographical anatomy of the kidneys and bladder	1.Draw a diagram of kidneys, ureters and bladder	
2.	Study the etiopathogenesis of acute and chronic pyelonephritis	2. Show the structure of parenchimaof kidneyson the diagram (cortical and marrow substance, CPS. 1. Read lecture material. 2.Explain the age dependence of the	

		frequency of disease (acute and chronic pyelonephritis). 3. Make a table of possibility of kidney disease on the basis of the following features: а) abnormality of the kidney development; б) function of the bladder; в) function of the ureters.	
3.	Clinical picture	Name leading symptoms of acute and chronic inflammation of the kidneys	
4.	Diagnosis of acute and chronic inflammation of the kidneys	1.Specify the main features of the disease on palpation 2. Name typical signs of: а) Acute and chronic pyelonephritis according excretory orography; б) ultrasound examination; в) radioisotope reography Pay attention to differences, structure of parenchyma of kidney, function of kidney in acute and chronic inflammation	
5.	Treatment	Specify: а) indications for the conservative or surgical treatment; б) indicationfornephrectomy; в) principles of treatment of primary and secondary pyelonephritis; г) methods of surgical treatment	

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Module number 1

Thematic module number 2

The theme of the lesson: Nonspecific inflammatory diseases of the urinary organs.

Actuality of the theme

Just about 60% of the urological diseases are nonspecific suppurative inflammatory diseases of the urinary organs. The patients with the infection of the urinary tract is often turned to the therapists, venerologists, gynecologists, what makes these theme actual for physicians in any specialty.

Educational aims.

Studying the basic concepts of the urinary infection. Make the imagination about the clinic, the diagnosis and the treatment of the inflammatory diseases of the lower urinary tract and the male genitalia.

A student must know:

1. What is the urinary tract infection.
2. Cystitis (classification, clinical picture, diagnosis, treatment).
3. Urethritis.
4. Prostatitis (classification, clinical picture, diagnosis, treatment, prognosis).
5. The diseases of the male external genitalia.

A student must be able to:

1. Carry out the research of the male genetalia (dummy patient).
2. Identify the leykocyturia (samples of analysis).
3. Interpret the data of the bacteriological examination of urine, the prostate secretion of the prostate (samples of analysis).
4. Explain the spermogram (samples of analysis).
5. Make out a prescription of drugs which is commonly used

(lecture materials).

Practical skills are reserved in practice:

a. Catheterization of the bladder with the elasticcatheter

Intersubject integration

Disciplines	To Know	Will be able to
1. Previous courses: Normal and topographical anatomy	The structure of the urinary system and the male genital organs, topographical anatomy of the lumbar area and the pelvic	
Biochemy	Biochemical indicators of the functional ability of the kidneys	
Normal physiology	Partial indicators of the renal functions	—
Propaedeutics of the internal diseases		Make the palpation and percussion of the genitourinary system, make examination of the external genitalia

Context of the theme.

Urinary Tract Infection (UTI) –is the inflammation of the urinary tract, which causes the infectious agents. Most of all it is due to the presence of bacteria. The infectious process is considered significant if in the biological research are more than 150,000 bacteria in 1 ml of urine.

Cystitis is the inflammation of the mucosa of the bladder. There are primary and secondary cystitis. Theprimarydevelops in the healthy body, and the secondarycomplicates any disease or abnormality of the genitourinary system. Just about 80% of factors of the inflammation is Gram-negative flora. In 25% cases is the microbial associations. If there is the absence of the bacterial pathogen we must

exclude the tuberculosis, mycoplasma, chlamydia, and others. In the considering of the topic we should also separate the cervical cystitis and leukoplakia the bladder which is observed in the chronic inflammation.

And separately, there is the interstitial cystitis. The diagnosis of this disease makes by the exclusion (of the other factors of dysuria), with the cystoscopy is observed the hlomerulation (submucosal hemorrhagic formation) and Hanner's ulcers (orange-pink ulcers of mucosa of the bladder). Cystoscopy is performed under the general anesthesia, as this disease is reduced the bladder capacity (if the anestetical volume is less than 600 mL it indicates about the moderate damage, but if it is less than 300 ml –it indicates the serious injury). The treatment consist ofthe hidrody latatsia and prescription of dimetilsulfacsid in the initial stages of the disease, but in the severe injuresit is the surgical treatment (augmentation cystoplastycs, suprapubicdischarge of urine).

Paracystitis is the inflammation of the connective tissues around the urinary bladder. Pericystitis is the inflammation of the peritoneum which is covering the bladder. Urethritis is the inflammation of the urethra.

Prostatitis is the syndrome which is presentedwith the symptoms that due to the presence of the inflammation or the infectious processin the prostate gland. These symptoms are: the terminal dysuria, the functional disorders of the urination, the pain in the perineum, the frequent urination,the pain during the ejaculation.

Classification: bacterial,acute or chronic, nondacterial prostatitis.

In prostatodinia there are the symptoms of prostatitis, but in the study ofprostate secretion the leukocytes andmicrobial flora are absent.

Treatment is complex. Antibiotic therapy is ineffective in prostatodinia.

With the aim to improve the diagnosis of abacterial prostatitis is used the studies of the intracellular parasites, viruses, fungi, trichomonads by the method of polymerase chain reaction, which is exaggerates the reliability of 90%.

In the abscess of the prostateis appliedthe drainage through the rectum, in acute retention of urine –it is the suprapubic discharge of urine.

Epididymitis–is the inflammation of the epididymis.

Funikulit–is the inflammation of the membranes of the spermatic cord.

Orchitis–is the inflammation of the testicles.

Phlegmon of the penis occurs very rarely**.**

Gangrene of the penis and scrotum. The factors can be paraphimosis, the compression any round ringsubject. On the background of poor circulation joins the infection. The weak patients or the patients with diabetes are most affected.

Balanoposthitis–is the inflammation of the head and anterior skin of the penis

The principles of antibacterial theraphy

• in acute uncomplicated infections of the urinary tract performs the urinalysis and prescribes three-day course of fluoroquinolones (cypro-floksacyn 250 mg or ofloxacin 200 mg twice daily) or trimethoprim-sulfamethoxazole to 960 mg 2 times a day. The prescription of nitrofuran, amoxicillin, cephalosporins is used 10-day course.

• If you have diabetes, in the age over 65 years, with a relapse of infection the antibacterial therapy is carried out for 7-10 days.

• In complicated infections of the urinary tract should be examined the urine of

definition of agent, both before and after the treatment. The treatment with antibioticsbroad-spectrum should be lasted 7-14 days, with severe form the drugsappointed parenterally (preferably intravenously).

• In the identifying blue pus bacillus antibiotic therapy lasts at least 14 days.

• With frequent re-infections in sexually active women administered postcoital prophylaxis a single dose of fluoroquinolones (200-250 mg), nitrofurantoin (50-100 mg), cephalexin (250 mg) or trimethoprim-sulfamethoxazole (240 mg). Such prevention should be held not less than 6 months and then review its appropriateness.

• Screening and treatment of asymptomatic infections of the urinary tract is appropriate only during the pregnancy and after the instrumental urological examination. The criterion of necessity of treatment, is discharging not less than 100 000 microbial bodies in 1 ml of urine in 2 consecutive trials.

• In pregnancy is used amoxicillin, cephalosporins, Furamagum, nitrofurantoin.

In the infection of men genitals(prostatitis, epididymitis) continue the treatment for 4-6 weeks.

Structural and logical scheme of the context

Nonspecific inflammatory diseases of the urinary tract

	Educational elements	
1 order	II order	III orderf
	Cyctisis	
Etiology	Infectious Chemical Toxic Radiative Iatrogenic Nutritional Neurogenic Involutional Postoperative	
Classification	Acute Chronic	Catarrhal Hemorrhagic Fibrinous Instructing Ulcerous Gangrenous Abscess Necrotic Catarrhal Instructing Granulation Parenchymal Polipoznyy Cystic

Symptomatic	Dysuria Pain in the bladder Pyuria Typical cystoscopical picture (with prolonged acute or chronic cystitis)	
Treatment	Sparing treatment Diet Antibacterial therapy Thermal procedures Spasmolytics Physiotherapy Local therapy Novocaine blockade Surgical treatment	
	Urethritis	
Classification	Front, back, Acute, chronic Specific Bacterial, nonbacterial Mixed	
Clinic and diagnostics	Dysuria, discharge from urethra. Initial pyuria. Ureteroscopy. Bacteriological study of urine, discharge from the urethra. PCR	
Treatment	Etiotropic therapy Instillation Provocative tests	Antibiotics, metranidazol, fungicide products
Prostatitis		

Classification	Acute, bacterial, Catarrhal Follicular, parenchymal abscess Bacterial chronic Nonbacterial Prostatodinia	
Clinic	Dysuria Pain in pubis area, perineum Urinary retention in abscess High temperature (at acute prostatitis) damage of sexual functions Neurasthenia	
Diagnostics	Finger rectal examination. Three glasses test of urine Laboratory secretion research of Prostate gland Bacteriological study of urine and the secret of prostate gland (PG) Test Mirs-Itamey. PCR(chain reaction)	
Treatment	Diet Antibacterial therapy Vitamins Massage of prostate Phytotherapy Physiotherapy Surgical treatment	Drainage of prostate abscess sclerosis of prostate
	Epididymitis, orchitis	
Clinic	Pain, chills, increased temperature The increase of testicular in size	
Treatment	Bed regiment Diet Antibacterial therapy	
	Local therapy Physiotherapy. Surgical treatment	
Balanitis, balanoposthitis		

Clinic	Head and internal layer of the anterior skin are swollen, hyperaemic,the manure excreted from the cavities	
Treatment	Local theraphy	with paraphimosis
	Surgical treatment	
Phlegmon of the penis		
Clinic	High temperature. The pain in the area of injury	
Treatment	Massive untebacterial theraphy	
Gangrene of the penis and scrotum		
Clinic	High temperature, chills, ceptic condition, the pain in the penis, hiperemia and the edge flash is swallen and the scrotum is swallen too	
Treatment	Surgical treatment. Massive antibiotic therapy Disintoxication therapy	
Erectile disfunction		
Classification	Psychogenic. Organic	
Diagnosis	Sexual anamnesis. History of the disease. Physiological test. Physical examination. Investigation of blood. Measurement of the night tumestsention of penis. The Dopplerultrasonography. Cavernozometriya. Cavernosography. Arteriography of penis	

Treatment	Sexsotherapy. Drug therapy. Vacuum erector. Drug injecting therapy. Implantation of prosthesis of penis. Arterial revascularization. Ligation of veins of the penis. Combinational therapy	
Infertility of the men		
Classification	Secretory Excretory Combined Immunological Other forms (Unclassified)	Secretory-endocrine secretory-toxic
Diagnostics	General examination Objective examinations ofsexual organs. Laboratory research ejaculate, prostatic secretion. Hormonal studies. Henitohraphy. Biopsy of testis	
Treatment	General measures General health care. Stimulation of spermatogenesis. Surgical treatment	Give upbad habits, occupational and other factors.Vitamins, biogenic stimulators, camative or stimulates criative agent. Chorionic gonadotropin, preparationsof testosterone, and others.

Question:

1. What is the urinary tract infection?
2. Classification of cystitis.
3. Clinic of cystitis
4. Diagnosis of cystitis
5. Treatment of cystitis.
6. Classification of prostatitis.
7. Clinic and diagnosis of prostatitis.

8. Treatment of prostatitis.
9. Inflammation of the external genitalia.
10. Erectile Dysfunction.
11. Infertility of the men.

Professional algorithm of examination of the patient (patient card Supervision):

Sequense of actions	Approximate base actions	Self-control
Complaints and history	When and how the symptoms developed, primary disease or relapse. Precipitating factors, previous treatment	old age, urostaz, diabetes, BPH, purulent infection, influenza and others
Objective research	Palpation of the kidneys, Pasternatsky's symptom, rectal examination, examination organs ofscrotum	
Additional studies	Urinalysis, urine bacteriological examination, ultrasound and others.	
Set of diagnosis and choice ofthe tactics of treatment	Conservative therapy. Operative intervention References	

Situational problem (III)

Patient '35 years old had complaints of the frequent urination in small amounts of urine, imperative feeling andpain during the urination in pubis area. The patient is ill the first time ,it began 2 days ago. There is leykocyturiya in the analysis. Set a preliminary diagnosis and determinethe tactics of treatment.

Diagnosis: Acute cystitis. Diet, fluoroquinolones or nitrofurans, if it is necessary, we can use the antibiotic therapy by the bacterial urine test.

The man 40years old has the complaints of the dull pain in perineum, the rapid ejaculation, the decreased potency. He considers that he is ill for 5 years. Previously he was treated on the chronic prostatitis. At the rectal examination, prostate moderately enlarged, painful, and has soft consistency. After the massage – strongdischarge of secretion. Check the previous diagnosis, give the plan of examination and determine the tactics of treatment.

Diagnosis: acute exacerbations of chronic prostatitis. The examination - ultrasound, prostate secretion analysis. Treatment: antibiotic therapy, physiotherapy techniques, spa and sanatorium treatment.

Problem number 2, the third test in differential diagnositcs. for example

Symptoms	Diseases		
	cyctitis	urethritis	prostatitis
1	+	+	-
2	+	+	-
3	-	+	+
4	+	+	-

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Module# 1

Thematic module №2

Thethemeofthelesson: Inflammatory diseases of retroperitoneal space (paranephritis, Ormond's disease)

Topicalityofthetheme

Inflammatory diseases of retroperitoneal space (IDRS) affectpeopleofanyageandtheyoccurin the practice of doctors of various specialties, most oftenin physicians, pediatricians, obstetricians, gynecologists and surgeons. In many cases IDRS can run asymptomatically or with symptoms thatshows to another inflammatory process elsewhere. These processes are often very difficult to identify and differentiate from other inflammatory processes. A variety of pathogens and the fact that the first symptoms of these diseases usually occur already during the development of purulent process in the relevant area, or in few days or even weeks after they occur, causes the importance of careful taking of medical history and determines which infections were in patients previously. It should be noted that the inadequate treatment of these processes can be complicated and these complications can threaten the patient life. This makes the importance of this problem.

Learning aims

A student must know:

- Main factors of etiopathogenesis of paranephritis and Ormond's disease
- Classification;
- Clinical symptoms;
- Significance of laboratory research methods for the diagnosis;
- Mainfeatures according to data of X-ray, ultrasoundand radioisotope research methods;
- Principlesoftreatment, indicationsforconservativeand surgical treatment;
- Principlesof antibacterial therapy;
- Notionofurosepsisandprinciples of its treatment;

A student must be able to:

- Identify leukocyturia (samples of analysis);

- Interpret the data of bacteriological urinanalysis (samples of analysis);
- Apply instrumental methods for the diagnosis of IDRS (set of instruments);
- Identify principles of treatment strategy for IDRS (lecture materials, student'sbooks);
- Prescribe drugs to treat IDRS (Inflammatory diseases of retroperitoneal space) (lecture materials).

Practical skills are reserved on practical training lessons:

- Assessment ofthe indicators of biochemical analysis of blood (samples of analysis).

Interdisciplinary integration

1. Previous discipline Anatomy	Anatomy of the retroperitoneal space	
Topographical anatomy and operative surgery	Topography of the retroperitoneal space of the genitourinary system	
Physiopathology	Pathological changes in the functions of the retroperitoneal space and the genitourinary system	
Roentgenology and Radiology	Methods of X-ray diagnostics radiography, ultrasonic scan.	Be able to interpret the data of theX-ray radiography and ultrasound scan.
2. The following courses\discipline Hospital surgery	Surgical approach to the retroperitoneal space	Choose the method of access to the retroperitoneal space.

Content of the theme

A. Paranephritis (PN) – this is the inflammation of the perirenal fiber. There are primary and secondary paranephritis.Primary paranephritis it is a result of the infection in a hematogenous way from the suppurative cells or focus. It is located outside the kidney.It promotes by injury, lumbar injury, hypothermia, etc.

Secondary the paranephritis occurs as a complication of the inflammatoryprocesses in the kidney. It is often localized on the left and has acute and chronic process.

Classification.

For localization:

- bottom (the lower end) of the kidney, upper (the top end) of the kidney, front(between the kidney and the colon)

- back (between the kidney and the lumbar muscles)

- total (all tissue)

Etiology. The primary paranephritis is often caused bygram-positive flora. The secondary process is caused by Escherichia. Coli\colon bacillus, bacteria (Rroteus, Pseudomonas). In acute paranephritis St. Aureus is often shown.

The main symptoms of acute paranephritis:

- high temperature;
- chill;
- pain in the lumbar and the hypochondrium;
- tension of the abdominal muscles;
- scoliosis with distortion towards the healthy kidney;
- leukocytosis;
- with neurogenic PN - pyuria;
- with hematogenous PN - proteinuria, cylindruria, microhematuria.

Types of PN:

- infiltrative;
- purulent;
- sclerotic

Pathogenesis. The process of renal tissue develops as in the next scheme: infiltrative-swelling changes - fester - cicatricial sclerosis. When the process isdragged out the manurespread towards to the lumbar region:

- break under the skin in thetendon space under the 12thrib or the lumbar triangle above the crest of the ilium - swelling;
- manure goes down in the femoral triangle area - flexion contracture of the hip joint.

Chronic paranephritisis a result of untreated acute paranephritis. It occurs as a complication of chronic calculous pyelonephritis.

Main symptoms:

- Dull pain in lower back ;
- Moderate rising of the temperature;
- Leykograma shifts to the left;
- Increase of ESR;
- exacerbation of the urinary symptoms.

Diagnostics. Instrumental methods.

Radioscopy – reducing of the amplitude of the excursion of diaphragm on the affected side, reactive pleural effusion in the sinus on the affected side.

- Plain urograms - the effaced contour of the lumbar muscles.
- Excretory urography - reduced function.
- Puncture around the renal substance - pus (perform the opening the abscess or the explorative lumbotomy).

- Ultrasound – it is a cavity surrounded by a capsule with fluid.

The treatment is conservative, if it is ineffectiveit will be operational treatment. And the acute condition of PN is conducted by subcostal retroperitoneal lymbotomia. In chronic PN – the conservative or also the operational treatment. It should be noted that the organ-saving operations is unsuitable.

B. Retroperitoneal fibrosis (Ormond's disease)

Ormond's disease can be single or bilateral. It is localized at the level of 4^{th} - 5^{th} lumbar vertebrae and lower. The variants of the course are the tube shape and the tu-case.

Histologically there are three phases of chronic nonspecific inflammation:

1. Diffuse infiltration.

2. Fibrous connective tissue changes with the progression of collagen fibers.

3. Sclerosing and shrinkage of fibrous tissue.

Clinically defined:

- dull attacks of pain in the lumbar area;
- fatigue;
- increased blood pressure;
-renal deficiency.

Diagnostics. Instrumental methods:

- Excretory urography;
- Retrograde ureteropelography and antegrade pelouretrohraphy;
- Radionuclide methods.

The corticosteroids is used for the conservative treatment, these drugs promote the resorption. The surgical methods are also used: ureteroliz, the resection of the ureter, the ureter replacement, autotransplantation of the kidney.

Structural and logical scheme of the lesson.

Inflammatory diseases of retroperitoneal space (paranephritis, Ormond's disease)

Educational elements		
I order	II order	III order
Etiology	Acquired factors	Acute and chronic inflammation of the kidneys focus of infection in the body
Pathogenesis	Inflammatory processes in the surrounding renal tissue	Infiltrative and swelling changes: suppuration, cicatrical scoliosis
Symptomotology	General infectious symptomatics Lower back pain Changes in blood Changes in urine	Contact with physical activity

Questions:

1. Etiology and pathogenesis of paranephritis and Ormond’s disease.
2. Name the classification of paranephritis.
3. The main symptoms of paranephritis and Ormond’s disease.
4. The main complication of paranephritis and Ormond’s disease.
5. The main methods of diagnosis of paranephritis and Ormond’s disease.
6. The principles of conservative treatment.
7. The types of surgical treatment.

Situational problems (L = II)

1. The patient, 48 years old, came to the hospital with the complaints of the pain in the right lumbar area after physical activity. In the history of disase the weight loss was 10 kg during the year, and the blood pressure was increased in the last 8-10 years. The abdomen is objectively soft, in the prone position the lower pole of right kidney is palpable.

Diagnosis. The plan of examination. Treatment.

Correct answers: chronic right sided paranphritis. Ultrasound, excretory and plain urography, laboratory testing. Surgical treatment.

2. The patient, 40 years old, came to the doctor with the complaints of the constant dull pain in lumbar in the left side during the last 4 years. The blood pressure was increased, and there were the attacks of acute pyelonephritis 3 times a year. Pasternatsky's symptom is positive in the left side. In the prone position lower pole left kidney is palpable.

Diagnosis. The plan of examination. Treatment.

Correct answers: chronic left sided recurrent paranphritis (differentiate with Ormond's disease), it is needed to do the excretory urography Ultrasound, CT. Surgical treatment.

Professional algorithms for mastering the skills and abilities

Tasks	Instructions	Notes
Study the method of punctureperirenal substance	The puncture of the renal substance is implemented,with the topographically-anatomical features of retroperitoneal	Pay attention to the localization of the kidney in the retroperitoneal space
Make a chart of examination of the patients with paranephritis and Ormond's disease	Usethe anamnesis, radiological and instrumental methods of examination	Pay particular attention to the data of previous examinations, inspections

Situational problem L = III level.

Learning tasks, the tests of the third level, they completes the independent work

A. Which method has the highest objectiveness to the diagnostics of paranephritis:

1) plain urograms;

2) retrograde pieloreterography and antegrade ureteropiyelography;

3) rentgenoscopy;

4) palpation of the kidneys;

5) excretory urography.

Correct answer - 5.

B. Task III level:

Patient P., 35 years old went to hospital on the 13th day after the planned operation on Ormond's disease, the patient had complaints of increasing body temperature and pain in the right lumbar area.

Make a plan of examination.
Set a previous diagnosis.
Prescribe treatment.

Correct answers. Retrograde urography, catheterization of the right kidney with the catheter, if this is uneffective it must be the examination of the kidney. The acute postoperative pyelonephritis.

Approximate card for students' independent work with literature.

№	Tasks	instructions	Correct answer
1	Study the morphology of paranephritis and Ormond's disease	Show the variety of paranephritis	Classification of pararanephritis: A) for etiology; B) for localization C) For course
2	In the studying ofthe symptomatology pay attention on the main symptoms of paranephritis and Ormond's disease	Name the main symptoms of paranephritis and Ormond's disease	The main symptoms of paranephritis: - High temperature; - Chill; - Pain in the lumbar and hypochondrium; - Tension of abdominal muscles; - Scoliosis of distortions in the way; - Leukocytosis; - With nephrogenic PN - pyuria, with hematogenous - proteinuria, cylindruria, microhematuria. The main symptomsof Ormond's disease: - dull attacks of pain in the lumbar area; - Fatigue; - Increased blood pressure; - Kidney deficiency

3	Study the methods ofdiagnostics of paranephritis and Ormond's disease	Name the main methods of diagnosis of paranephritis and Ormond's disease	The main methods of diagnosis of paranephritis - plain programme; - the puncture of perirenal substance; - ultrasound;- excretorial urography; -retrograde pyelouterography -antegrade pyelography - nucleamedicine study - computed tomogram, magnetic resonance image
4	Learn the principles of the treatment of the paranephritis and Ormond's disease	Name the main methods of treatment of paranephritis and Ormond's disease	The treatment of paranephritis and Ormond's disease: - Conservative - Operational

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Module # 1

Thematic module # 2

Theme of the lesson Specific inflammatory diseases (tuberculosis of the organs of urogenital system)

Topicality of the theme

Renal tuberculosis, tuberculosis of bile ducts and tuberculosis of male genital organs is one of the most serious urological diseases. It takes the first place among extrapulmonary TB.

In clinical practice all urogenital organs without exception can be involved with tuberculosis. Tuberculosis most often affects kidneys and epididymis among male genital organs.

About 1 billion people of the world are infected and 10 million people having clinical signs of tuberculosis consult a doctor annually. 20% of cases of extrapulmonary tuberculosis is renal tuberculosis. Difficulties of diagnosis, the tendency to spread of urogenital tuberculosis determine the topicality of the given theme.

Learning aims.

A student must know:

Main factors of tuberculosis etiopathogenesis.
Clinical and radiological classification of tuberculosis.
Data of physical, laboratory, radiographic, ultrasonic methods of examination.
Differential diagnostic of tuberculosis with other diseases.
Principles of tuberculosis treatment.
A student must be able to:

- Analyse the causes of the disease (lecture materials, textbooks).
- Interpret methods of clinical examination (past history, samples of analysis), data of laboratory examination (patients, samples of

analysis).

- Interpret the results of of X-ray, ultrasound, radionuclide methods of examination (set of images).
- Make a scheme of examination and treatment of the patients with tuberculosis of urogenital system organs (lecture materials, textbooks).
- Determine the principles of therapeutic approach in tuberculosis of urogenital system organs (lecture materials, textbooks).

Practical skills assigned to practical lessons:

Rules of performing and assessment of cystoscopy and chromocystoscopy results (dummy, atlas)

Intersubject integration.

#	Subject	You should know	You should be able to
1	Therapy	Low lobe pleuropneumonia	Perform differential diagnostics with listed diseases and tuberculosis of urogenital system organs Interpret all methods of examination correctly: - laboratory; - X-ray; - radioisotopic; - ultrasonic etc.
2	Surgery	Acute and chronic - cholecystitis - pancreatitis - ulcer	
3	Gynecology	Acute and chronic - adnexitis	
4	Infectious diseases	- typhus - malaria - leptospirosis	
5	Nervous diseases	- osteochondrosis - radiculitis	

Content of the theme of the lesson

Severe forms of primary tuberculosis develop in children and adults in conditions of unfavourable effect of environment that decreases body resistance, hunger, exhausting physical labour, and poor living conditions. It occurs among the social and unsecured population.

Due to the accident at the Chernobyl nuclear power plant there is evidence that suggests that the reduction in radiation exposure of cellular and humoral

immunity may be one of the factors that contribute to the development of tuberculosis in the body as a result of endogenous reactivation.

Tuberculosis of the genital organs - secondary, so-called organ tuberculosis. It develops in many years after the first clinical manifestation of tuberculosis. Urogenital tuberculosis occurs mostly in age of 20-40 years old. The main channel of spread of tuberculosis infection is hematogenous. First the kidneys are affected, and from there the infection enters through the blood vessels in renal pelvis, bladder, ureter.

In early stages of the disease general weakness, malaise, early fatigue, weight loss, loss of appetite, dull pain in the lumbar area, subfebrile body temperature are sometimes observed.

Changes of epididymis, thickening of spermatic cord are observed in physical examination of men.

Changes in blood are not specific for tuberculosis. Most often there is leukocytosis with shift of leukogram to the left and slight decreasing of eosinocytes number. Lymphopenia and hypochromic anemia may occur. The patients with tuberculosis have acid urine reaction, moderate proteinuria, pyuria, microhematuria.

Provocation test, i. e. 15-20 tuberculin units are injected subcutaneously to reveal pathologic elements, micobacteria. Leukocyturia and erythrocyturia are intensified in tuberculosis. Tuberculosis of male genital organs has chronic course, only tuberculosis of epididymis occurs in acute form. The patients have pain in the corresponding half of the scrotum, scrotal swelling and redness, increased body temperature to 39 ° C.

Chronic form of the disease begins unnoticed and takes its course asymptomatically. A little painful compression, which increases gradually, appears in epididymis. The process extends to spermaduct, and then to the egg. Epididymis unites with skin in the rise of infiltration.

The most reliable and objective evidence of tuberculosis of urinary organs are sowing of Mycobacterium tuberculosis from urine sediment. Bacterioscopic, bacteriological and biological methods of examination are used for it.

Radiological methods of examination are used to reveal morphological and functional changes in a kidney.

Single and multiple foci of calcification or shadow of sclerosed ureter can be found in a plain urogram.

Petrificates in the kidneys, strain and even destruction of the parenchyma, enlargement of cups are observed in excretory urography. Ureters can be narrowed. The bladder volume is reduced. The most informative method of diagnosis of tuberculosis of the bladder is cystoscopy. Small pale yellow or gray-yellow tubercular protuberances can be revealed at the urethral orifice of the affected kidney. Urethral orifice is inverted, deformed, it gapes.

Treatment of the patients with tuberculosis of the urinary system includes both conservative and surgical measures. The volume of treatment depends on the stage of the pathological process.

Resection of the kidney, nephrectomy, nephrostomy can be performed in surgical treatment. Application of anastomosis in different parts of the ureter, or its replacement by small intestine can be also performed. Intestinal plastic surgery is performed in case of contracted bladder.

Conservative treatment must be prolonged and continuous. Absence of changes in urine composition during 5 years after completion of treatment and positive dynamics of immunological, radiological and X-ray indicators indicates about a complete recovery.

Structural and logical scheme of the theme content.

Specific inflammatory diseases

(tuberculosis of the organs of urogenital system)

Learning elements		
Of the first order	Of the second order	Of the third order
Etiopathogenesis	Type and nature of microbial flora. Ways of penetration of pathogenic flora into the kidney. Changes in immunobiological reactivity	Mycobacteria of tuberculosis Hematogenic
Clinical picture and diagnosis	Subjective and objective signs. Urine analysis. Instrumental studies. USE. Radiological and X-ray diagnostics	Weakness, pain, dysuria. Revealing of "sterile" leukocyturia. Chromocystoscopy. Catheterization of ureters. Radiological signs. Radioisotope renography, scintigraphy, scanning
Treatment	Conservative Surgical	Specific antituberculous drugs. Dietotherapy. phytotherapy. sanatorium-and-spa treatment. Mobilization of host defenses.. Elimination of stasis of urine, kidney resection or nephrectomy.

Questions:

Progress test	
1. Tell what is the way of penetrating of mycobacterium of tuberculosis in tuberculosis of the kidney.	1.Hematogenic 2.Changes in urine passage.
2. Tell the classification of kidney tuberculosis	1. Undestructable infiltrate 2. Initial destruction (papillitis) 3. Limited destruction (cavernous) 4. Total destruction, pyonephrosis
3. List the main methods of examination of tuberculosis of the organs of urogenital system.	1. Past history of the disease 2. Clinical examinations 3. Laboratory studies 4. Endovesical examination 5. Endoscopic examination
4. Endicate the main symptomatics of kidney tuberculosis	1. Backache 2. Hematuria 3. Dysuria 4. Pyuria
5. Specify the diagnostic methods in tuberculosis of the urinary system	1. Bacterioscopic 2. Bacteriological 3. Biological 4. Biopsy

6. List the methods of X-ray studies of kidney tuberculosis	1. plain urogram 2. Excretory, infusion urography 3. Retrograde, antegrade pyelography 4. Angiography 5. Radioisotope X renography 6. Scanning 7. Cystography
7. Name the most pathological changes in urine	1. Strong acid reaction of urine 2. Pyuria 3. Hematuria 4. Proteinuria 5. Sow of mycobacteria
8. List the main methods of treatment	1. Conservational 2. Operational 3. sanatorium-and-spa
9. Point the methods of treatment: a) conservational b) surgical c) sanatorium-and-spa treatment	1. Antibacterial, tuberculin therapy with hormones and vitamins a) organ saving : kidney resection, cavernotomia, cavernoektomia; b) reconstructive – Saving operation of Boari – the plastic of pelvic-ureteral segment; c) nephrectomy 1. Shefronovo 2. Glukhovska 3. Pioneerska 4. Southen Coast of Crimea, Alupka, Sonyachne

The structure of the lesson

The sequence of actions	Approximate base of actions	Self-control
Complaints and anamnesis	Was the patient sick before with tuberculosis. Did the patient have the contact with TB patients? Complaints Living conditions, food Is there dysuria, the effectiveness of anti-inflammatory therapy	Weakness, subfebrilitet
Objective research	Palpation of the kidney Pasternatsky's symptom Rectal examination examination of the scrotum	

Additional examination	Urinalysis Complete analysis of blood Cystoscopy Plain urography Excretory urography, retrograde ureteropiyelohraphy Cystography	Aseptic pyuria, acidic urine, proteinuria, microhematuria, detection of mycobacterium of tuberculosis. Lymphocytosis Tubercle of tuberculosis (miliary formation of crown hyperemia). Foci of calcification disorder of the discharge of contrast, deformation pelvic-calicial system, amputation of cups, the presence of caverns, enlargement of the ureters, microcyctes
Set a diagnosis	The stage of the process (X-ray classification)	
The choice of the medical tactics	Conservative therapy. The surgical intervention. Recommendations	

Task 1 (L - III)

The patient S. 40 years old has the disease which began with the dull pain in the sacral area. He had sweating, performance loss, low-grade fever. There is tuberculosis of cervical vertebrae in the history of disease. The patient was treated. Then he has been discharged from the dispensary ward. There is leukocytes which cover the field of view in urine, the protein 1.0, the reaction of urine is acidic.

Diagnosis? Research efforts.

Standard solutions

We can consider about the tuberculosis of the kidney. It is necessary to make the excretory urography, urine analysis (several times), cystoscopy.

Task 2 (L - III)

2. The patient was treated in hospital because of the kidney tuberculosis. At this time the patient has the complaints of the frequent painful urination with small portions. There is the presence of nebulous urine and it was found Koch mycobacteria in urine analisys.

Diagnosis? Research efforts.

Standard solutions

Tuberculosis of the kidney and the bladder. For the further diagnosis it is necessary to make endoscopic studis, excretory urohraphy and cystogram.

Task 3 (L - III)

3. The patient K. had acute epididymitis2 years ago. At this time he has the complains of the presence of purulent hollows of scrotum. In the palpation of hills in the area of application testicular involved fistulas, the skin of scrotum is soldered to the application.

Diagnosis?

Standard solutions

Probably it can be tuberculous epididymitis. To clarify it is necessary to make some X-ray roentgenogram of the lungs, excretory urogram, plating analysis of urine, secretions of the prostate. Punctate of suspicious foci for biopsy. (Tuberculous epididymitis).

The approximate map for the independent work of students with literature.

№ з/п	Tasks	Instructions to the task	Independent records of students
1	Causes of tuberculosis of the genitourinary system	Write etiologic and pathogenetic factors that may cause tuberculosis of the genitourinary system	
2	Classification of tuberculosis	Clinical and radiological classification	
3	Diagnostics of tuberculosis	List the main methods for examination of the patients with tuberculosis of the urogenital system. Specify what method of research is important in the diagnosis of tuberculosis of the bladder	
4	Complications of tuberculosis	List the possible complications.	
5	Differential diagnostics	Name the disease that may simulate tuberculosis clinic of the genitourinary system	
6	Treatment of tuberculosis of the genitourinary system	Make the treatment regimen of the patients. List what operations are performed in tuberculosis of the genitourinary system	

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Module number № 1

Thematic module number № 3

The theme of the lesson: Traumatic injuries of the urogenital system.

Actuality of the theme

The damage of the urinary tract are common, sometimes it is accompanied by injuries of other internal organs. Recognition of the disease in time helps the doctor of any specialty to give qualifying aid and help to avoid some mistakes in determining the treatment strategy.

The aim of the lesson:

Study the principles of diagnostic and treatment strategy in the damage of kidneys, bladder and urethra**.**

Astudent must know:

- classification of the kidney damage;
- clinical symptomatology damage of the kidneys and the diagnostic methods;
- indications for conservative and surgical treatment of damaged kidneys;
- classification of the damage of the bladder;
- symptoms and diagnostic methods out-and intra-peritoneal rupture of the bladder;
- pathogenesis of damage of the urethra;
- clinic and diagnostics of urethra rupture;
- principles of operative treatment of urethra ruptures.

A student must be able to:

- Palpate and percuss the kidneys and the bladder (patients);

- make retrograde cystography and uretrography (dummy);

- interpret radiographs of the patients with the injuries of the urinary system (a set of roentgenogram).

Practical skills are reserved on practical lessons

• Interpretation of the results: a) plain and excretory urography,

b) Isotope renography

c) ultrasound sonography (set of images)

Interdisciplinary integration

Discipline	To Know	Should be able to
I. Previous 1. Anatomy 2. Physiology 3. Physiopathology and histology 4. Pathological anatomy	The structure of the upper and lower urinary ways Development of the urinary organs in normal Development of the urinary organs in conditions of embryonic pathology Clinical and morphological classification of injuries	Show the main anatomical parts and formation of the urinary tract Identify the main critical periods of the fetation development Show the main ways of pathogenesis of the injuries of urinary organs Differentiate the kidney injury depending on the level of damage. Prepare the disinfectants Estimate the emotional state of the patient to choose the future

5. General Surgery 6. Problems of medical deontology 7. Roentgenology and medical radiology	Asepsis and antisepsis The idea of the medical secret Ethics of communication with the patients in this category Basic methods of X-ray and radiological diagnostics, know radiopharmacological medicine	approach to the psycho-therapeutic aspects of the treatment. Interpret X-ray images and scintigram
Intersubject integration. 1. Urolithiasis, abscess of the kidney, kidney tuberculosis and urinary organs, carbuncle of kidney, dystopia of kidney, cyst of kidney, obstructive uropathy, varicocele, acute pyelonephritis, ureterocele 2.The question of	The main clinical symptoms of these diseases, the idea of the clinical data course of nosological forms Techniques of	Analize the results, clinical examinations and the laboratory examinations of the patients with the listed nosologies

prevention of the postoperative complications	postoperative regimen management in patients.	
3. The concept of the surgical and conservative treatment	The number of operative intervention and organ saving surgery. The main operational aproach. Basic principles and scheme of usage of types of the treatment	Estimate the degree of damage using the clinical, the laboratory and the instrumental methods of investigation. Make a specific treatment regimen for situational problems

The context of the lesson

The most common causes of the kidney injury are the traffic accidents, falls and sport injuries.

There are characteristic signs of the kidney injury: the pain in the lumbar region (broken rib, subcutaneous, retroperitoneal hematoma), gross hematuria, microhematuria and systolic blood pressure below 90 mm.

The rupture of the bladder could be intraperitoneal, out-peritoneal and combined. In the cases of the rupture of the bladder should be performed cystography, check Zeldovich's symptom. After the performance of cystography follows uretrography.

The most common testicle injuries are closed testicular trauma and described testicular trauma in the pelvic position of the fetus. The injury of the testicles is usually a solitary damage, but sometimes the cause is penetrating object. In the most cases the closed injury leads to the rupture of the testicle. If the testis can be palpated and the swelling is small, the testicle, paradidymis and the structures of spermatic cord must be carefully examined. If there is any defect that can be palpated in the protein shell it is an indication for the surgical treatment.

Medical management of testicular trauma is next. First of all it is necessary to determine the cause of damage. If there is ultrasound it must be done the examination of the testicles that helps to identify the rupture of protein coat. It must be carefully examined the data\results of clinical examination. If there is a doubt about the seriousness of the injury, the surgical intervention contributes to faster patient recovery than the tactics of waiting.

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Structural and logical scheme of the context of the theme

Traumatic injuries of the urogenital system.

Educational elements		
The first order	The second order	The third order
Damage of the kidneys		
Classification of closed injuries	The rupture of fatty cells and fibrous capsule, subcap-sular rupture of parenchyma, the capsule and parenchyma rupture without and with penetration into a bowl, crushing the kidney, kidney isolation, slaughter of the	

	kidney	
Symptomatics of closed injuries	The pain, the swelling in the lumbar area, hematuria, the spinal curvature in the direction of the injury	
Diagnostics of closed damage	The role of chromocystoscopy, plain urography, excretory urography - Native CT-with contrast - Ultrasound - Angiography	The absence or blurring of circuit of kidneys and lumbar muscles, weak or late filling contrast pelvic-caliceal system, out of the kidney leakage of the contrast, the absence of the functions of the kidney
The main features of open damage	Hematuria, the role of indigocarmin tests for the kidney injury, leakage of urine into the wound	
Treatment	Indications for the conservative treatment. Methods of the conservative therapy Indications for the urgent surgical intervention in closed damages.	Bed regimen Analgesics. Application of the hemostatic products. Antibacterial medicine Combined the kidney damage with the damage of intraabdominal organs, internal bleeding, that is accompanied by anemia and lower blood pressure,

	Indications for the urgent surgical intervention in the open injures. Organ keeping operations Indications for nephrectomya	increase of around-renal hematoma (urohematomy), intensive hematuria. All types of open damage, it is the signs of acute inflammation in the damaged kidney or paranephria. Suturing of the kidneys, the kidney resection. Selective embolization of blood vessels than bleed. Crushing the kidneys, tear off the kidney of the vascular pedicle, numerous wide damage
Damage of the bladder		
Classification	Closed injures Open injures, interaabdominal ruptures retroperitoneal ruptures	Correlation between the pelvic bones fractures and out-abdominal ruptures. Abruption of the bladder from urethra.
Simptomatics of the retroperitoneal ruptures	Pain above the pubis. Disorder of urination. Hematuria. Perineal hematoma	Irradiation of the pain in the perineum, the occurrence or increased pain when trying to urinate Spurious urge to urination, accompanied by tenesmus, the discharge of a small amount of urine, could be

	Palpation of the abdomen, the presence of urinary infiltration, the primary localization of pain in the abdomen	the retention of urine The tension of front abdominal wall above the pubis
Characteristic features of the intraabdominal ruptures	Diffuse nature of pain around the stomach, the tension of anterioventral abdominal wall, the dullness of percussion sound without clear lines	
Leakage of urine from the wound in open injuries.	Open injuries	
Diagnostics.	Catheterization of urinary bladder. Opportunities and dangers of cystoscopy Retrograde cystography is the main method of diagnostics of with contrast	Lack of urine in catheterization, the discharge of small amounts of urine, that is coloured with blood, discharge of large amounts of liquids in excess of the capacity of the bladder. Radiography in two projections. Defferred cystography, leaking the

		contrast out of the bladder
Treatment	Conservative treatment of nonpenetrating damage	Antibacterial therapy, hemostatic therapy, catheterization of the bladder
	Operational treatment.	Restoring the integrity of the bladder, the discharge of urine, urinary drainage of urinary leakage, the drainage of abdominal cavity
Damage of the urethra		
Mechanism of closed damage	The damage of tuberous part it is due to the influence of external forces on the urethra, the damage of membranous and prostate part of pelvic bones fructures, instrumental damage	
Classification by the degree of damage	Partial (nonperetrating) gap, the full (nonperetrating) gap uretrorapia	Urinary leakage, necrosis of tissue in the area of hematoma, the origin of phlegmon, the development of urosepsis
Symptomatics	Complete retention of urine, partial retention of urine, the presence of urohaematoma uretrorrahia, the total swelling in palpation of the prostate	The appearance of uretrorrahia in pressing on the area of prostate
Diagnostics	Uretroghraphy is the main method of diagnostics	

Treatment of nonpenetrating damage	Bed rest, cold on the perineum, antibacterial therapy, catheterization of the bladder, epicystostomy	
Treatment of penetrating damage	cutting and drainage of hematoma, primary urethra - urethral anastomosis, epicystostomy	
Structures of urethra as the consequence\result of its damage		

Questions:

- Classification of the kidney damage

- Clinic of intra-abdominal rupture of the bladder.

- Treatment of the slaughter of the kidney

- Methods of surgical treatment of the rupture of urethra

- Classification of the urethra injuries.

Tests the II-nd level:

1. The main radiological signs of rupture of the kidneys:

- the symptom of "burning tree";

*- the leaking of contrast substance outside the cavity system

- diliation of the cavity system of the kidney;

- calicoectasia

. Psoas symptom - is:

the back pain;

the bend of the trunk;

* - the absence of the outline\contour of the lumbar muscle on the plain urogram;

- the leaking of contrast of the substance.

Professional algorithm of examination of the patients.

Tasks	Oriental basis of actions	Self-control . Comments
Complaints	The nature and localization of pain The presence of hematuria, uretroraphy The nature of urination Complaints that inherent the damage of other organs	
Anamnesis	Time of injury, its nature What was the feelings after the injury What kind of first aid received and by whom it was provided. Did the patient suffered earlier in the dissease of genitourinary system What is the time of occurrence of hematuria, uretrorrahy When was the first call of urination explain and how it was	
Objective research of the patient	The general condition of the patient color of skin, mucous membranes, the presence of abrasions, scratches, bleeding, hematomas. The presence of deformities,	Shock, collapse, signs of alcohol poisoning Psoas symptom, the position of "frog"

	crepitation Condition of bones Palpation of the abdomen, suprapubic area, urethra, perineum, external genitals. Macroscopic examination of urine	symptom of "Vanka- vstanka ", scoliosis The presence of symptoms of peritoneal irritation, free fluid
Laboratory research	General analysis of blood. General analysis of urine	Anemia. Hematuria
Additional examinations	Ultra sound X-ray examination. Instrumental examination	
Diagnosis and basis of medical strategy	Conservative tactics. Operation	

Situational problems

1. The patient, 43 years old, entered to the clinic with the pain in the left part of the lumbar area, which emerged after the falling from the height of 2 m. After the injury the presence of double macrohematuria was noticed during the urination. The condition is moderate. Blood pressure and pulse is in rate. There weren't pathological changes in the chest and abdominal cavity. There is small painful swelling in the left lumbar area. Give the preliminary diagnosis and explain it.

2. The patient, 25 years old, was brought to the clinic with pain in the right lumbar area, with gross hematuria with clots. The patient was hit with the hard object in the right lumbar region an hour ago. The situation is forced: there is expressed scoliosis in a sick way. The painful swelling is determined in the area of right hypochondrium. Pulse is 120 bpm. in 1 min. SC 85/50 mmHg There isn't the signs of peritonitis. There is not defined the free fluid in the abdominal cavity. The left kidney of normal size on

excretory urograms, pelvic-calicial system is not changed. The passage of radiopaque substance along the ureters is not disturbed. The right contrast fluid in the projection kidney and urinary tract is not determined, chromocystocopy: with an eye of right ureteral there is a blood stream, indigocarmine is not determined within 12 min of observation. Urine on the left is colored with indigocarmine, appeared on the 7-th minute. Your diagnosis? Therapeutic approach? Is there any sense in the performance of a secondary or additional research?

3. The patient, 40 years old, clinically and radiologically diagnosed retroperitoneal rupture of the bladder. Your treatment approach?

Approximate map for independent work with literature

- study the classification of renal damage
- clinical symptomatology and diagnostics of kidney damage
- indications for conservative and operative treatment of kidney damage
- classification of the bladder injuries
- clinic and diagnostics injuries of the bladder
- treating injuries of the bladder
- pathogenesis of urethra injury
- diagnostics of urethral rupture
- treating injuries of the urethra.

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Module# 1

Thematic module #2

Theme of the lesson Urolithiasis.

Topicality of the theme.

Urolithiasis is 30-45% of all urological diseases. The process is duplex almost in every 8-10th patient. The wide spread and frequent recurrences underline the topicality of the problem of early diagnosis, treatment and prevention of urolithiasis.

Purpose of the lesson.

The purpose of the lesson is to learn the issues of etiopathogenesis, symptomatology, diagnosis and treatment of urolithiasis to carry out differential diagnosis of acute surgical diseases of the abdominal cavity, providing first medical aid in emergency conditions (renal colic, anuria, hematuria) and for timely direction of patient to the doctor –urologist in necessary cases.

A student must know:

- Causes of urolithiasis appearance.
- Classification of the urinary stones by chemical composition
-Clinical manifestations of urolithiasis
-Diagnosic methods of urolithiasis.
- Principles of urolithiasis treatment.

A student must be able to:

- Make an adequate plan of investigations, state a sequence of additional means of diagnosis (lecture material, textbooks).
- Determine the level of disturbance of kidney function and complications in urolithiasis (lecture material, textbooks, patients).
- Make a plan of urolithiasis treatment (conservative, surgical, instrumental) (lecture material, textbooks).

Practical skills appointed to the practical lesson:

- carry out differential diagnosis of renal colic with acute surgical diseases

Intersubject integration

#	Subject	You should know: clinical picture, aethiology, pathogenesis	You should be able to
1	Therapy	Lower lobe pneumonia	Make differential diagnosis between listed diseases and urolithiasis Interpret all methods of examination properly: - laboratory; - roentgenologic; - radioisotopic; - ultrasound and others
2	Surgery	Acute cholecystitis Pancreatitis Appendicitis Ulcer, perforated ulcer, intestinal obstruction, intestinal neoplasms	
3	Gynecology	acute adnexitis - suppurating ovarian cyst - extrauterine pregnancy	
4	Inflammatory diseases	- typhus - malaria - leptospirosis - enteritis (colitis, enterocolitis)	
5	Phthisiology	- acute pulmonary tuberculosis, - renal tuberculosis	

Content of the lesson

Urolithiasis is 30-45% of all urological diseases. It is one of the widespread diseases and it is the second after inflammatory diseases of urogenital system. Urolithiasis is polyetiologic. It is caused by congenital anomalies, climatic conditions, deficiency of vitamins and microelements, hormonal disorders, inflammatory processes and so on.

Pain (dull pain, nagging pain or renal colic), hematuria, discharge of sand and stones are main symptoms of urolithiasis in the past history. Pyuria and dysuria are observed rarely.

In 20-25% of cases urolithiasis has active course and can simulate various diseases, including acute lesions of the abdomen (acute appendicitis, cholecystitis, pancreatitis, ileus, rupture of gastric ulcer and duodenal ulcer).

USE, chromocyctoscopy and computed tomography play an important role in differential diagnosis of acute diseases of abdominal cavity.

Ultrasound scanning of kidneys, ureters and bladder plays an important role in diagnosis of urolithiasis. We can determine acoustic characteristics of the stone with echo scanning.

X-ray examination gives important information of urolithiasis diagnosis. It should be started with plain urography. Shadows of concrements are revealed on the film except X-ray negative stones that consisted of uric acid – urate, cystine stones and protein stones.

The diagnose is made completely after introducing of radiopaque substance (excretory urography). Computed tomography gives the most accurate information about size, position and density of the stone.

Radionuclide methods are used to determine the morphological and functional disorders of the kidney. In urolithiasis, they do not provide information about stone itself, but one can determine the degree of damage of the kidney parenchyma and disturbance of urinary tract patency with their data.

There are some complications of urolithiasis:

- acute and chronic pyelonephritis (secondary, calculous);
- secondary hydronephrosis;
- fatty degeneration of kidney;
- nephrogenic hypertension;
- acute renal failure (calculous anuria),
- chronic renal failure.

In case of renal colic attack first of all pain should be eliminated. Warm bath or cold (irrigation of lumbar area with chloroethyl), antispasmodics introduction, novocaine blockade of the spermatic cord in men, and place of attachment of the round ligament of the uterus to the abdominal wall in women are used for it. Catheterization of ureter is administered in cases when mentioned methods are ineffective.

Independent discharge of stones is possible when stones smaller are than 1 cm. "Water shots", diuretic and antispasmodic drugs help it. Indications for removal of stones are the following:

- complications of urolithiasis;
- recurrent total macrohematuria;
- pains depriving the patient of efficiency;
- size of a stone is more than 1 cm.

Methods of stones removal:

- remote shock- wave lithotripsy;
- endourological removal (contact lithotripsy and lithoextraction);
- open surgery;
- Litholysis: (ascending, descending).

Structural - logical scheme of the theme content

Urolithiasis

Learning elements		
The first order	The second order	The third order
Rate prevalence		
Aethiology	Congenital abnormalities, creating stasis of urine	Anatomical defects of the urinary tracts development, neurogenic diseases of urinary tract Congenital tubulopathies (fermentopathies) Inherited nephrosis-like and nephritis-like syndromes
Pathogenetic factors	Exogenous:	Climatic and geographic factors: a)dry hot climate; б) limited drinking regimen; в) iodine deficiency in the environment, natureof nutrition; г) excessive amount of ergocalciferol in the body
	Endogenous general:	Disturbance of liver function and alimentary canal: а) latent and manifest hepatopathies; б)hepatogenic gastritis ; в)colitis and other diseases. Diseases of endocrine glands: а) hyperparathyroidism; б) hyperthyrosis; в) hypo pituitary diseases. Diseases of bones, joints, chronical damage of internal organs etc.
	Endogenous local:	Chronic inflammatory process in kidneys Disturbance of urodynamics
Pathogenesis	Theory of organic matrix Colloid-crystalloid theory	

Mineral composition of stones	Urate, oxalate, phosphate, carbonate, cystine stone, cholesterol, coral calculus stone	
Symptomatology	Pain in lumbar area: Hematuria Discharge of salts and stones with urine Dyspeptic manifestations Pyuria	
Diagnostics	Data of medical history, physical examination, laboratory, radiological and radionuclide studies, ultrasound examination. Chromocystoscopy Biochemical investigation of blood and urine on stone-forming substances	Plain urogram Excretory urography retrograde urethropyelography antegrade pyeloureterography Computed tomography
Copmlications	Acute and chronic pyelonephritis. Pyonephrosis. Hydronephrosis Nephrogenic hypertension Acute kidney failure (AKF), Chronic kidney failure(CKF).	

Treatment	Conservative	Drug therapy Sanatorium-and-spa treatment Dietotherapy
	Surgical	Open surgeries Pyelolithotomy Calicolithotomy Nephrolithotomy Ureterolithotomy Pyelonephrolithotomy Percutaneous ultrasound lithotripsy
	Instrumental	Distant shock-wave lithotripsy. Contact lithotripsy.

	Main stage. 1. Forming of professional skills and abilities 2. To perform supervision of the patient with urolithiasis 3.To carry out an objective investigation 4.To estimate examination data. 5.To make a diagnose. 6. To carry out differential diagnostics with acute appendicitis, cholecystitis, pancreatitis, extrauterine pregnancy etc. 7.To determine the scheme of treatment of patients with urolithiasis. 8.Methods of surgical procedures.	III	Professional training in performing of supervision of the patient: examination, data analysis, differential diagnostics, determining of treatment plan Practical training in consolidating of palpation skills, urograms reading, catheterization, chromocystoscopy Solving of non-typical tasks on diagnostics, differential diagnostics and treatment of the patients with urolithiasis	Patients, a map or an algorithm of supervision of a patient Analysis. Instruments. Tasks of the third level	45 min

3.	**Final stage.** 1. Control and correction of professional skills and abilities level 2. Summing up of the lessons (theoretical, practical and organizational) 3.Home task	III	Analysis of results of patients supervision Solving of non-typical situational tasks. Individual control of practical skills	Results of supervision of patients Non-typical situational tasks, tests of the third level. Approximate map of student independent work with sources	15 min 7 min 3 min

Theoretical questions to the lesson.

1. Significance of climatic and dietary factors in urinary stones forming.
10. Hyperparathyroidism as a factor of urolithiasis.
11. Role of pyelonephritis in stone forming.
12. Characteristics of urinary stones by chemical composition.
13. Main symptoms of urolithiasis.
14. Role of USE and chromocystoscopy in diagnostics of urolithiasis.
15. Means of diagnostics of X-ray negative stone.
16. "False" stones of urinary system and means of their revealing.
17. List factors and the most typical symptoms of renal colic, differential diagnose stages of aid.

10. Complications of urolithiasis.

11. Main methods of diagnostics of bladder stones.

12. Clinical nutrition of the patients with urolithiasis depending on chemical compositions of stones.

13. Therapy, aimed at the independent discharge of stones

14. Indications for surgical procedure.

15. Lithotripsy, endourological removal of stones.

16. Litholysis.

Test control L = 2

Tasks (L = II)

№	Levels of mastering	Test of progress	
		Questions or tasks	Model of solving
1.	II	Microhematuria is a frequent symptom in urolithiasis	Yes
2.	II	Indicate aetiological factors of urolithiasis: 1. Disturbance of parathyroid glands activity 2. Infection 3. Supercooling 4. Age 5. Tubulopathies	1,2,3,5
3.	III	Clinical symptoms of urolithiasis: a, b, c:	a-pain; b-hematuria; c-disorder of urinary excretion
4	III	Describe clinical picture of renal colic: a, b, c, d:	a) intensive pains in lumbar area; b) irradiation to the external genitalia; c) dysuria is frequent and painful urination; d) macrohematuria and microhematuria
	II	Typical tasks: The stone of 2x2 cm was revealed in pelvis of the right kidney in a 40-year-old male patient after X-ray urological examination. The disease is accompanied by frequent hematuria, renal colic attacks, periodical exacerbations of pyelonephritis; function of the right kidney is reduced.	a) operation; *b) pyelolithotomy; c) nephrolithotomy; d) nephrostomy; e) resection of the kidney; f) nephrectomy

Structure of the lesson

Tasks	Approximate base of actions	Self control
Questioning	Complaints Medical history	Localization and nature of pain, time of its appearance; how did it appear, localization, irradiation, what is the pain accompanied by. Nature of urination. Amount of urine. Changes of urine colour. Time of the appearance of the first symptoms, peculiarities of its development. Discharge of sand or stones earlier, their chemical composition. Results of previous urinalysis. Performed operations. Nature and effectiveness of previous treatment. The presence of the patient's risk factors for urolithiasis. The presence of urolithiasis in relatives.
Objective examinations	General patient's condition. Condition of skin and subcutaneous cellular tissue. Examination of lumbar area. Palpation of kidneys. Pasternatsky symptom	
Data of laboratory tests.	General analysis of blood General urinalysis Biochemical investigations	Amount of leucocytes, leukogram, amount of erythrocytes, hemoglobin, ESR pH of urine, protein, erythrocites, leucocytes and salts of urinary sediment Urea, creatinine of serum, calcium, phosphorus, magnesium, uric acid, sugar of blood and urine

Results of additional diagnostic methods	X-ray, USE, cystoscopy, chromocystoscopy	Plain urogram Excretory urogram Retrograde ureteropyelography Cystography The presence of ultrasound track Indications,results
Establishing of previous diagnose	Indicate in written form what symptoms and syndromes examined patient had, suggested diagnosis	Basic. Complications. Concomitant diseases
Plan of treatment	Surgical treatment. Endourological treatment Instrumental treatment Conservative therapy Nephrectomy	Indications Technique of performing Administration of pharmacological preparations

Situational tasks of the third level L

1. A 37-year-old male patient was hospitalized to the clinic with pains in the right iliac area, dysuric disorders, and moderate abdominal distension. He had appendectomy two months ago. The diagnose of appendicitis was not confirmed. Microhematuria was revealed in examination of urine. The patient has correct body build, satisfactory nutrition, there is postoperative scar in the right iliac area, and there are pains in the same place on palpation.

What methods of extra examination are necessary to make a final diagnose?

The model of solving.

General analysis of blood
Plain and excretory urography with previous chromocystoscopy.

USE.

CT – if it is necessary.

Non-typical task.

2. A 40-year-old patient was brought to the clinic with pains in the left lumbar area. Pain is cramping. Macrohematuria is revealed in urine examination. The patient has a correct body build in objective study. Tenderness in the left kidney area is revealed on palpation. Pasternatsky symptom is sharp positive in the left. Cavity system in the left and initial part of the ureter is dilated in USE. Concrements in the kidney and upper third of ureter were not revealed.

What methods of extra examination are necessary to make a final diagnose?

The model of solving.

3. General analysis of blood.

4. Plain and excretory urography, excretory urography with delayed image.

Approximate map for independent work with sources.

#	Tasks	Indications to the tasks	Independent student notes
1.	Causes of urolithiasis	Write main aetiological factors that can cause urolithiasis	
2.	Clinical picture of renal colic	Name typical signs of renal colic	
3.	Diagnostics of urolithiasis	List main diagnostic stages on examination of the patients with urolithiasis. State what method of special urological examination is important in diagnostics of urolithiasis	

4.	Complications of urolithiasis	List possible complications of urolithiasis	
5.	Treatment of acute and chronic calculous pyelonephritis.	Name the differences in therapeutic approach of acute and chronic pyelonephritis in presence of nephrourolithias.	
6.	Treatment of urolithiasis	List the conservative methods of treatment of urolithiasis. List typical operations performed in presence of urolithiasis	
7.	Differential diagnostics of renal colic (nephrourolithias)	Name the diseases of the abdominal cavity organs that may stimulate renal colic (nephrourolithias)	

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MODULE №1

Thematic module №2

Theme: Hydronephrosis, urethrohydronephrosis.

Actuality of the theme

Hydronephrosis (hydronephrotic transformation) is a stable progressing distention of caliceal-pelvic system with atrophy of renal parenchyma and disorder of its function, resulted from disorder of urine outflow.

Aim of the lesson:

Student must know:

- Causes of disease development.
- Peculiarities of clinical course of urethra-hydronephrosis, hydronephrosis.

Student must be able to:

- Interpret hydronephrosis stages, to explain disorders of renal function, depending on stage (material of lectures, text-books).
- To make scheme of examination and to comment and explain results of roentgenologic, USI, radio-nuclear, angiography methods of examination (set of images, pictures).
- To define principles of treatment tactics in case of hydronephrosis, ureteral-hydronephrosis (material of lectures, text-books).

Interdisciplinary integration

№	Discipline	To know: clinical picture, etiology, pathogenesis	To be able to
1.	Therapy	Chronic pleura-pneumonia	To make differential diagnostics against mentioned diseases and hydronephrosis ureteral-hydronephrosis
2.	Surgery	Acute and chronic - cholecystitis - pancreatitis - ulcer disease - intestinal neoplasms - neoplasms of retroperitoneal area - fibrosis of retroperitoneal area	To correctly explain all methods of examination: - roentgenologic; - radio-isotope; - ultrasonic; - angiography, etc.
3.	Gynecology	Acute and chronic adnexitis	
4.	Neurologic diseases	Vertebrogenic radicular syndrome	

Contents of the lesson

Hydronephrosis may result from narrowing of caliceal-ureteral segment, deviation of ureter, squeezing of it with blood vessels, obstacle along the route of ureter and in lower portions of urinary ways, as well as from neurogenic disturbances in the urinary system, which are followed by congestion of urine in the kidney, distention of calices and renal pelvis, microcirculation disorders and atrophy of parenchyma of organ. Hydronephrosis more often occurs in boys.

Hydronephrosis may be of two types: a) primary or congenital; b) secondary or acquired, as well as unilateral- and bilateral, aseptic and infectious, open, closed and intermitting; there are no clinical symptoms specific for

hydronephrosis. Aseptic unilateral hydronephrosis is asymptomatic for a long period of time.

Pain in the kidneys area is one of the most often symptoms. Intensity of pain depends on stage of narrowing of urinary ways. Sometimes pain in the kidney is combined with hematuria, elevation of body temperature, chill.

On physical examination in children deformation of abdomen is observed, kidney is palpated as big, movable tumor, elastically-tense, with even surface.

The most informative means of diagnostics are USI, plain and intravenous urography; they often give possibility to define cause of hydronephrosis. If kidney is not functioning, retrograde (antegrade) uretero-pyelography, CT, MRT, RRG is performed to reveal changes in it.

In presence of pyeloectasias only prolonged follow-up is carried out and only in case of disease progressing, surgical treatment is proposed.

In case of hydronephrosis of the I and II stages plastic surgeries are performed.

In case of III stage of hydronephrosis and normal functioning of contra-lateral kidney, nephrectomy is performed. Prognosis is favorable in case of timely performed surgery.

Structural-logic scheme of theme contents

Educational elements		
I order	II order	III order
Etiology	Obstacle in PUS area Obstacle along the route of urethra. Obstacle in lower portions. Neurogenic disorders in urinary organs	Primary (congenital) (acquired)

Symptoms	First stage (pyeloectasia) Second stage (pre-hydronephrosis) Hydrocalicosis: distention of renal pelvis and calices. Third stage (hydronephrosis)	Distention of renal pelvis with moderate disorder in the kidney. Hydrocalicosis – distention of calices, decrease of parenchyma thickness with expressed disorder of function, atonia of renal pelvis. Atrophy of parenchyma
Diagnostics	Past history and objective symptoms. Investigation of urine. Roentgenologic investigation. USI	Plain and excretory X-ray examination. Retrograde urethra-pyelography. Computer-aid tomography. Angiography
Treatment	Conservative Surgical	Nephrotomy. Open plastic surgeries. Endoscopic interventions (antegrade and retrograde endopyelotomy and endoureterotomy

Theoretical questions

1. Etiology and pathogenesis of hydronephrosis and uretero-hydronephrosis.
2. Basic symptoms of uretero-hydronephrosis
3. Stages of hydronephrosis
4. Role of USI and roentgenologic studies in diagnostics of hydronephrosis
5. Name additional methods of investigation and their significance
6. Complications of hydronephrosis and uretero-hydronephrosis
7. Indications to surgical intervention
8. Methods of surgical intervention depending on etiology of hydronephrosis
9. Prognosis of the disease

Situation tasks (L=II)

1. Female patient T. aged 16 was hospitalized to the clinic, complaining of constant pains in the lumbar area. From anamnesis: patient suffers from pains

over the last 5 years. Earlier was not examined. On objective investigation: abdomen is soft, painless, Pasternatsky's symptom is slightly positive in the right side. In USI - widened PCS of the right kidney, renal parenchymas are from 0,8 - 1,0 cm, ureter is not defined. On plain urogram – right kidney is less in sizes, on excretory urograms in the left, function of kidney is not disturbed, in the right - separate calices are noted, sizes of 7-15', in 2 hours cavity system of kidney is sharply widened.

Diagnosis, additional methods of investigation, treatment, prognosis.

Answers:

Hydronephrosis of II stage

Additional methods of investigation:

Retrograde uretero-pyelogrphy of the right, trans-femoral aortography Treatment of patient is only surgical. Prognosis is favorable in case of timely surgical intervention. Renal function after surgery improves.

2. Male patient, aged 70 years referred to reception ward, complaining of difficult urination.

On objective examination: abdomen is soft, tender over the pubis, Pasternatsky's symptom is slightly positive from both sides. On USI, widening of PCS and ureters to the intersection with iliac vessels is noted.

In urine analysis– moderate leucocytosis, in blood analysis – moderate elevation of ESR.

Name diagnosis and methods of additional investigation, methods of treatment.

Standard of answer:

Benign hyperplasia of the prostate gland, II stage. Bilateral uretero-hydronephrosis.

Additional methods of investigation:

- Plain excretory urography, cystography, USI

Treatment is surgical, prostatectomy, function of kidneys after surgery improves.

Professional algorithm of examination of a patient.

Tasks		Notions, self-control
Complaints and anamnesis	Localization and character of pain. Time of appearing of the first signs of disease, their further development. Changes in quantity of urine output	
Objective study	To assess patient's state. Skin state. While inspecting abdomen, to pay attention to its asymmetry, presence of protrusions. To perform palpation of abdomen in supine position, lateral position, upright one. To define Pasternatsky's symptom	Pulse, AP, respiratory rate Slightly painful, enlarged, elastic, with smooth surface kidney may be felt on palpation.
Additional study	State of white and red blood. Analysis of urine. Bacterial flora of urine. Urea content. Plain and intravenous urography. Retrograde uretero-pyelography. USI.	Anemia, leukocytosis. Erythrocyturia, leukocyturia, protein presence. Contours of kidneys, presence of contrast shadows in kidney projection and urinary ways, to assess kidney function, disorder of patency of upper and lower urinary ways, dilatation of PCS. To assess state, thickness of parenchyma, presence of distention of initial portion of urethra. To assess state of urinary bladder, presence of distention of terminal part of urethra

Diagnosis making	To make diagnosis of main disease, its complications, presence of other urologic diseases, concomitant pathology	
Choice of treatment tactics	Attentive supervision. (Repeated examination in a year) Surgical treatment	Pyeloectasia Plastic surgery of pelvic-urethral segment, uretero-caliceal anastomosis, uretero-cystoneostomy, endo-urologic means of correction (antegrade and retrograde)

Situation tasks L = III level

Task L = III

1. 35-year-old patient was hospitalized to the clinic presenting in the lumbar area, pains felt more in the right. From case history – right-sided hydronephrosis, I stage. Objectively: abdomen is soft, painless. Lower pole of the right kidney is palpable. Pasternatsky's symptom is positive in the right side. On USI a sharp distended cavity of the right kidney system is noted. In the pelvic-urethral segment calculus with the size of 1,5 cm is noted, urethra is not visualized.

Standard of answer

It is necessary to think about anomaly of development of the right kidney. Right-sided hydronephrosis, urolithiasis. Calculus of the right kidney. To confirm diagnosis it is necessary to make plain and excretory urogram, retrograde uretero-pyelography. Treatment is surgical (pyelotomy) plastics of pelvic-urethra segment.

Task L = III

2. Patient, aged 25 years was hospitalized to the clinic with complaints on pains in the lumbar area, periodical elevation of temperature to 38°C. Difficult urination, thin, flaccid stream. Objective study: abdomen is soft, painful over the pubis, Pasternatsky's symptom is slightly positive in the both sides. Analysis of urine – leukocyturia, blood analysis – insignificant rise of ESR. On USI: sharp dilatation of cavity system of both kidneys as well as distention of ureters up to urinary bladder.

Standard of answer

Considering task, patient has infra-vesicular obstruction. To precise diagnosis it is necessary to make excretory urography, mixed cystography, retrograde urethra-cystography, to define amount of residual urine. Treatment is surgical (depending on cause of disease).

Oriented card for independent work with literature

№	Tasks	Directions	Student's independent notes
1.	Causes of uretero-hydronephrosis	Write down etiologic and pathogenetic factors, which may cause uretero-hydronephrosis	
2.	Classification of hydronephrosis	To name main types, classification	
3.	Diagnostics of uretero-hydronephrosis	Name basic methods of examination of patients with uretero-hydronephrosis. Point out which method is important in diagnostics	
4.	Complications of uretero-hydronephrosis	Name possible complications	

5.	Differential diagnostics	Name diseases, which may simulate clinical picture of uretero-hydronephrosis	
6.	Treatment of uretero-hydronephrosis, hydronephrosis	To make typical schemes of treatment. Name which typical surgeries are performed in case of uretero-hydronephrosis, hydronephrosis	

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Module # 1

Thematic module # 2

Theme of the lesson Specific inflammatory diseases (tuberculosis of the organs of urogenital system)

Topicality of the theme

Renal tuberculosis, tuberculosis of bile ducts and tuberculosis of male genital organs is one of the most serious urological diseases. It takes the first place among extrapulmonary TB.

In clinical practice all urogenital organs without exception can be involved with tuberculosis. Tuberculosis most often affects kidneys and epididymis among male genital organs.

About 1 billion people of the world are infected and 10 million people having clinical signs of tuberculosis consult a doctor annually. 20% of cases of extrapulmonary tuberculosis is renal tuberculosis. Difficulties of diagnosis, the tendency to spread of urogenital tuberculosis determine the topicality of the given theme.

Learning aims.

A student must know:

Main factors of tuberculosis etiopathogenesis.
Clinical and radiological classification of tuberculosis.
Data of physical, laboratory, radiographic, ultrasonic methods of examination.
Differential diagnostic of tuberculosis with other diseases.
Principles of tuberculosis treatment.
A student must be able to:

- Analyse the causes of the disease (lecture materials, textbooks).
- Interpret methods of clinical examination (past history, samples of analysis), data of laboratory examination (patients, samples of

analysis).

- Interpret the results of of X-ray, ultrasound, radionuclide methods of examination (set of images).
- Make a scheme of examination and treatment of the patients with tuberculosis of urogenital system organs (lecture materials, textbooks).
- Determine the principles of therapeutic approach in tuberculosis of urogenital system organs (lecture materials, textbooks).

Practical skills assigned to practical lessons:

Rules of performing and assessment of cystoscopy and chromocystoscopy results (dummy, atlas)

Intersubject integration.

#	Subject	You should know	You should be able to
1	Therapy	Low lobe pleuropneumonia	Perform differential diagnostics with listed diseases and tuberculosis of urogenital system organs Interpret all methods of examination correctly: - laboratory; - X-ray; - radioisotopic; - ultrasonic etc.
2	Surgery	Acute and chronic - cholecystitis - pancreatitis - ulcer	
3	Gynecology	Acute and chronic - adnexitis	
4	Infectious diseases	- typhus - malaria - leptospirosis	
5	Nervous diseases	- osteochondrosis - radiculitis	

Content of the theme of the lesson

Severe forms of primary tuberculosis develop in children and adults in conditions of unfavourable effect of environment that decreases body resistance, hunger, exhausting physical labour, and poor living conditions. It occurs among the social and unsecured population.

Due to the accident at the Chernobyl nuclear power plant there is evidence that suggests that the reduction in radiation exposure of cellular and humoral

immunity may be one of the factors that contribute to the development of tuberculosis in the body as a result of endogenous reactivation.

Tuberculosis of the genital organs - secondary, so-called organ tuberculosis. It develops in many years after the first clinical manifestation of tuberculosis. Urogenital tuberculosis occurs mostly in age of 20-40 years old. The main channel of spread of tuberculosis infection is hematogenous. First the kidneys are affected, and from there the infection enters through the blood vessels in renal pelvis, bladder, ureter.

In early stages of the disease general weakness, malaise, early fatigue, weight loss, loss of appetite, dull pain in the lumbar area, subfebrile body temperature are sometimes observed.

Changes of epididymis, thickening of spermatic cord are observed in physical examination of men.

Changes in blood are not specific for tuberculosis. Most often there is leukocytosis with shift of leukogram to the left and slight decreasing of eosinocytes number. Lymphopenia and hypochromic anemia may occur. The patients with tuberculosis have acid urine reaction, moderate proteinuria, pyuria, microhematuria.

Provocation test, i. e. 15-20 tuberculin units are injected subcutaneously to reveal pathologic elements, micobacteria. Leukocyturia and erythrocyturia are intensified in tuberculosis. Tuberculosis of male genital organs has chronic course, only tuberculosis of epididymis occurs in acute form. The patients have pain in the corresponding half of the scrotum, scrotal swelling and redness, increased body temperature to 39 ° C.

Chronic form of the disease begins unnoticed and takes its course asymptomatically. A little painful compression, which increases gradually, appears in epididymis. The process extends to spermaduct, and then to the egg. Epididymis unites with skin in the rise of infiltration.

The most reliable and objective evidence of tuberculosis of urinary organs are sowing of Mycobacterium tuberculosis from urine sediment. Bacterioscopic, bacteriological and biological methods of examination are used for it.

Radiological methods of examination are used to reveal morphological and functional changes in a kidney.

Single and multiple foci of calcification or shadow of sclerosed ureter can be found in a plain urogram.

Petrificates in the kidneys, strain and even destruction of the parenchyma, enlargement of cups are observed in excretory urography. Ureters can be narrowed. The bladder volume is reduced. The most informative method of diagnosis of tuberculosis of the bladder is cystoscopy. Small pale yellow or gray-yellow tubercular protuberances can be revealed at the urethral orifice of the affected kidney. Urethral orifice is inverted, deformed, it gapes.

Treatment of the patients with tuberculosis of the urinary system includes both conservative and surgical measures. The volume of treatment depends on the stage of the pathological process.

Resection of the kidney, nephrectomy, nephrostomy can be performed in surgical treatment. Application of anastomosis in different parts of the ureter, or its replacement by small intestine can be also performed. Intestinal plastic surgery is performed in case of contracted bladder.

Conservative treatment must be prolonged and continuous. Absence of changes in urine composition during 5 years after completion of treatment and positive dynamics of immunological, radiological and X-ray indicators indicates about a complete recovery.

Structural and logical scheme of the theme content.

Specific inflammatory diseases

(tuberculosis of the organs of urogenital system)

Learning elements		
Of the first order	Of the second order	Of the third order
Etiopathogenesis	Type and nature of microbial flora. Ways of penetration of pathogenic flora into the kidney. Changes in immunobiological reactivity	Mycobacteria of tuberculosis Hematogenic
Clinical picture and diagnosis	Subjective and objective signs. Urine analysis. Instrumental studies. USE. Radiological and X-ray diagnostics	Weakness, pain, dysuria. Revealing of "sterile" leukocyturia. Chromocystoscopy. Catheterization of ureters. Radiological signs. Radioisotope renography, scintigraphy, scanning
Treatment	Conservative Surgical	Specific antituberculous drugs. Dietotherapy. phytotherapy. sanatorium-and-spa treatment. Mobilization of host defenses.. Elimination of stasis of urine, kidney resection or nephrectomy.

Questions:

Progress test	
1. Tell what is the way of penetrating of mycobacterium of tuberculosis in tuberculosis of the kidney.	1.Hematogenic 2.Changes in urine passage.
2. Tell the classification of kidney tuberculosis	1. Undestructable infiltrate 2. Initial destruction (papillitis) 3. Limited destruction (cavernous) 4. Total destruction, pyonephrosis
3. List the main methods of examination of tuberculosis of the organs of urogenital system.	1. Past history of the disease 2. Clinical examinations 3. Laboratory studies 4. Endovesical examination 5. Endoscopic examination

4. Endicate the main symptomatics of kidney tuberculosis	1. Backache 2. Hematuria 3. Dysuria 4. Pyuria
5. Specify the diagnostic methods in tuberculosis of the urinary system	1. Bacterioscopic 2. Bacteriological 3. Biological 4. Biopsy

6. List the methods of X-ray studies of kidney tuberculosis	1. plain urogram 2. Excretory, infusion urography 3. Retrograde, antegrade pyelography 4. Angiography 5. Radioisotope X renography 6. Scanning 7. Cystography
7. Name the most pathological changes in urine	1. Strong acid reaction of urine 2. Pyuria 3. Hematuria 4. Proteinuria 5. Sow of mycobacteria
8. List the main methods of treatment	1. Conservational 2. Operational 3. sanatorium-and-spa
9. Point the methods of treatment: a) conservational b) surgical c) sanatorium-and-spa treatment	1. Antibacterial, tuberculin therapy with hormones and vitamins a) organ saving : kidney resection, cavernotomia, cavernoektomia; b) reconstructive – Saving operation of Boari – the plastic of pelvic-ureteral segment; c) nephrectomy 1. Shefronovo 2. Glukhovska 3. Pioneerska 4. Southen Coast of Crimea, Alupka, Sonyachne

The structure of the lesson

The sequence of actions	Approximate base of actions	Self-control
Complaints and anamnesis	Was the patient sick before with tuberculosis. Did the patient have the contact with TB patients? Complaints Living conditions, food Is there dysuria, the effectiveness of anti-inflammatory therapy	Weakness, subfebrilitet
Objective research	Palpation of the kidney Pasternatsky's symptom Rectal examination examination of the scrotum	

Additional examination	Urinalysis Complete analysis of blood Cystoscopy Plain urography Excretory urography, retrograde ureteropiyelohraphy Cystography	Aseptic pyuria, acidic urine, proteinuria, microhematuria, detection of mycobacterium of tuberculosis. Lymphocytosis Tubercle of tuberculosis (miliary formation of crown hyperemia). Foci of calcification disorder of the discharge of contrast, deformation pelvic-calicial system, amputation of cups, the presence of caverns, enlargement of the ureters, microcyctes
Set a diagnosis	The stage of the process (X-ray classification)	
The choice of the medical tactics	Conservative therapy. The surgical intervention. Recommendations	

Task 1 (L - III)

The patient S. 40 years old has the disease which began with the dull pain in the sacral area. He had sweating, performance loss, low-grade fever. There is tuberculosis of cervical vertebrae in the history of disease. The patient was treated. Then he has been discharged from the dispensary ward. There is leukocytes which cover the field of view in urine, the protein 1.0, the reaction of urine is acidic.

Diagnosis? Research efforts.

Standard solutions

We can consider about the tuberculosis of the kidney. It is necessary to make the excretory urography, urine analysis (several times), cystoscopy.

Task 2 (L - III)

2. The patient was treated in hospital because of the kidney tuberculosis. At this time the patient has the complaints of the frequent painful urination with small portions. There is the presence of nebulous urine and it was found Koch mycobacteria in urine analisys.

Diagnosis? Research efforts.

Standard solutions

Tuberculosis of the kidney and the bladder. For the further diagnosis it is necessary to make endoscopic studis, excretory urohraphy and cystogram.

Task 3 (L - III)

3. The patient K. had acute epididymitis2 years ago. At this time he has the complains of the presence of purulent hollows of scrotum. In the palpation of hills in the area of application testicular involved fistulas, the skin of scrotum is soldered to the application.

Diagnosis?

Standard solutions

Probably it can be tuberculous epididymitis. To clarify it is necessary to make some X-ray roentgenogram of the lungs, excretory urogram, plating analysis of urine, secretions of the prostate. Punctate of suspicious foci for biopsy. (Tuberculous epididymitis).

The approximate map for the independent work of students with literature.

№ з/п	Tasks	Instructions to the task	Independent records of students
1	Causes of tuberculosis of the genitourinary system	Write etiologic and pathogenetic factors that may cause tuberculosis of the genitourinary system	
2	Classification of tuberculosis	Clinical and radiological classification	
3	Diagnostics of tuberculosis	List the main methods for examination of the patients with tuberculosis of the urogenital system. Specify what method of research is important in the diagnosis of tuberculosis of the bladder	
4	Complications of tuberculosis	List the possible complications.	
5	Differential diagnostics	Name the disease that may simulate tuberculosis clinic of the genitourinary system	
6	Treatment of tuberculosis of the genitourinary system	Make the treatment regimen of the patients. List what operations are performed in tuberculosis of the genitourinary system	

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Module № 1

Thematic module №3

Theme of the lesson

Tumors of urinary system organs. Renal bladder cancer. Uricer.

Actuality of the theme

Efficacy of treatment of oncologic patients directly depends on treatment methods, and on timely diagnostics of malignant tumors in the most. It is timely early diagnostics that remains the most complicated and topical issue. Increase of level of sanitary culture, which directly concerns activity of doctors of general practice is of great importance for timely diagnostics of malignant neoplasms. In recent years disease incidence with tumor processes significantly increased, this is probably linked with consequences of Chernobyl accident, worsening of ecologic situation in Ukraine. That is why there are no doubts as for early diagnostics of this group of diseases, oncologic alarm of urologists as well as of local physicians in local polyclinics. Every physician must be familiar with revealing of timorous processes in urinary system.

Aim of the lesson

To study questions of etiopathogenesis, symptomatology, diagnostics and treatment of cancerous disease of urinary system organs, to be able to carry out differential diagnostics with other diseases, in case of necessity to be able to give the first medical care to patients.

Student must know:

- how to identify timorous diseases of kidney and tumors of renal parenchyma and those of renal pelvis;
- renal and extra-renal symptoms of renal carcinoma;
- principal difference in diagnostics and treatment of renal parenchyma and cancer of renal pelvis;

- measures directed at early revealing of relapse of timorous processes of urinary system.

Student must be able to:

- take case history in pathology, which is being studied (patients);

- palpate and percuss renal neoplasms (patients);

- interpret data of USI investigation in oncologic-urologic diseases (set of images);

-"read" cystograms and urograms (defect of contour, filling defect, dilatation of upper urinary ways) (set of images, atlas).

- CT data interpretation for oncology Aseases (set of mages)

Practical skills which are to be mastered at this lesson: making scheme of examination and treatment of patients with urologic pathology.

a. Interdisciplinary integration

DISCIPLINES	TO KNOW	TO BE ABLE
1	2	3
Previously studies subjects 1. Anatomy	Structure of upper and lower urinary ways	To show basic anatomical parts and formations of urinary ways
2. Physiology	Development of organs of urogenital system in the norm	To mark basic stages
3. Pathologic physiology and histology	Development of organs of urogenital system in conditions of embryonal pathology; Theories of development of tumors of urogenital system, ways of metastasis	To name basic critical periods of fetal development. To represent basic ways of pathogenesis of development of tumors of urogenital system

4. Pathologic anatomy	International classification by TNM system	To show correlation between morphologic type of tumor and progression of its growth; To define link between clinical manifestations of timorous process and symptoms
5.Faculty surgery	To name neoplasms of the left and right iliac areas, inflammatory processes with localization in the right iliac area and in the right hypochondrium	To differentiate tumors of small and large intestines, appendicitis, colitis, enteral colitis, acute intestinal obstruction, abdominal adhesion with tumors of urogenital system
6. Phthisiology	Tuberculosis of kidneys and urinary ways	To justify differential diagnostics of tuberculosis of kidneys and urinary ways with neoplasms of urogenital system
7. General surgery	Aseptics and antiseptics	To prepare disinfecting solutions
8. Problems of medical deontology	Notion on medical secret; Ethics of communication with this category of patients	To evaluate emotional state of a patient in order to choose further approach to psycho-therapeutic aspects of treatment
9. Roentgenology and medical radiology	Basic procedures of roentgenologic and radiologic diagnostics, to know radio-pharmacologic drugs	To comment and explain X-ray pictures and scintigrams; To define dose of radio-pharmacologic drug for the course of treatment
The following disciplines (which are provided) 1. Oncology	General principles of oncologic deontology; Modern views of oncologists as for principles of diagnostics and treatment of neoplasms of genital organs; Questions of dispensary	To define clinical groups of patients, depending on stage, duration and spread of timorous process as well as possibilities of giving special medical care

	fsupervision of such patients	
Interdisciplinary integration 1. Urolithiasis, abscess of kidney, tuberculosis of kidney and that of urinary ways, carbuncle of kidney, dystopia of kidney, renal cyst, obstructive uropathies, varicocele, acute pyelonephritis, ureterocele, hydronephrosis	Cardinal clinical symptoms of mentioned-above diseases, notion on clinical course of mentioned nosologic forms	To explain data of clinical investigation and laboratory study of patients with mentioned nosologies
2. Questions of prophylaxis of post-operative complications	Procedures of management of oncologic patient in post-operative period	
3. Notion on radical and palliative treatment	Extent of operative interventions and organ-saving operations; Basic surgical accesses (approaches)	To assess level of metastasizing by means of clinical, laboratory and instrumental methods of investigation
4. Notions on types of special treatment of patients with neoplasms of urinary system (combined, complex treatment)	Basic principles and schemes of methods of treatment	To make up a specific treatment scheme for situation task

Training content of the theme.

Renal cell carcinoma makes up 3% of general number of timorous diseases in adults and 85% of all primary-malignant renal tumors. In the genesis of renal carcinoma role of hormonal disturbances, impact of ionizing radiation and chemical substances, congenital defects of development is proved. Wilms' tumor develops from embrional primordiums due to disorders of development of primary and secondary kidney in more than 30 % of patients, renal cell carcinoma generally procuds without symptoms and is diagnosed by chance.

Macro- and micro-hematuria, pain in the abdomen or in the lumbar area and volumetric formation, palpable in the abdominal area are the most often signs. These signs make up classic triade. In metastatic lesion of organs, complaints connected with involvement of lungs or osseous system into pathologic process may be present. Renal cell carcinoma (RCC) may be defined by erythrocytosis, hyperpotassemia, hypertension, hyperthermia, disturbances of liver function, varicocele, elevated ESR, anemia. Diagnostic methods are USI, investigations of vessels, CT and MRT. Excretory urography, retrograde pyelography, isotopic scanning of kidneys has less sensitivity, especially in not large tumors. Renal adenocarcinoma may metastasize into regional lymphatic glands, lungs, bones, liver, brain. Nephrectomy is a single radical means of treatment of patients with RCC. Nephrectomy includes removal of the kidney within the limits of Gerout's fascia. Adrenal glands should be removed in case of lesion of the upper pole of kidney. In case of timorous thrombus in the inferior vena cava (IVC), prognosis significantly worsens, due to the fact, that surgical treatment becomes nonradical (palliative). That is why it is necessary to remove thrombus from the vein, therewith special attention should be paid to prevention of inter-operation migration of tumor fragment.

In patients with RCC metastases nephrectomy is palliative treatment and is applied in case of severe complications, which are connected with local manifestations. In patients with RCC and solitary operable metastases, tactics of removal of primary and metastatic nodes is justified. According to modern concepts, treatment of metastatic RCC requires removal of primary tumor. Prognosis in case of RCC is doubtful. 5-year survival rate makes up 17-44%, and 10-year – 11-29%. Papillary cancer of the renal pelvis is manifested by hematuria, pains in the lumbar area, sufficiently rare – by increase of kidney (secondary hydronephrosis). Diagnostics is based on the data of excretory urography (EU) and retrograde uretero-pyelography, uretero-pyeloscopy, cytologic investigation of urine, biopsy, USI, while vascular investigation is of little information value.

Metastasizing downward urinary ways.

Basic method of treatment is nephro-ureterectomy with two incisions. In recent years endoscopic resection of urethral orifice has been proposed; this allows to perform surgery of one approach.

Tumors of urinary bladder make up approximately 4% of all neoplasms. In males urinary bladder tumors are noted significantly more often, than in females (4 to 1). In development of urinary bladder tumors disturbances of metabolic exchange in the organism and congestion of urine in the urinary bladder, chronic inflammatory processes: interstitial cystitis, simple ulcer, leucoplakia, diverticulum of urinary bladder, etc.

Symptoms of tumors of urinary bladder are presented by hematuria and disuria in the most. Difficult urination from urinary bladder and upper urinary ways, disintegration of tumor and ulcer of urinary bladder wall promote joining of infection and development of cystitis and pyelonephritis. Infiltrative growth of tumor may cause squeezing of ureteral orifice, this is accompanied by pains in the area of kidneys, development of hydro-ureteronephrosis and pyelonephritis. In case of squeezing of orifices of both ureters, signs of renal insufficiency up to uremia development are joined.

Diagnostic methods: bimanual palpation of urinary bladder area allows to identify infiltrative tumors of urinary bladder; other ones – cytologic investigation of urinary sediments, ultra-sonic investigation, excretory urography, retrograde od sedimental cystography. Spiral computed tomography with contrast study and magnet-resonance tomography are modern methods with high informativity. The main and final means of diagnostics of urinary bladder cancer is cystoscopy with biopsy.

Differential diagnostics is carried out against tuberculosis or syphilitic tumor-like granulations in the urinary bladder, tuberculosis and simple ulcers of urinary bladder, endometriosis of urinary bladder, chronic hemorrhagic, granulomatous cystitis, nodular periarteriitis of urinary bladder, tumor extension from adjacent organs. In differential diagnostics of urinary ladder tumors with all mentioned above diseases, biopsy has the most significance.

Methods of treatment of urinary bladder tumors are divided into surgical and conservative ones. Endoscopic and open surgeries are related to surgical methods. Conservative treatment consists of radiation and drug therapy; in the most cases they are additional as to surgical treatment.

Open surgeries have some variants. Transurethral electro-coagulation is a treatment method of not large superficial tumors of urinary bladder. Transurethral electro-resection is “golden standard” in the treatment of superficial tumors of urinary bladder. It may be applied for palliative treatment of muscular-invasive tumors.

Resection of urinary bladder (open) - it is a high section of urinary bladder and resection of a part of urinary bladder wall, affected by tumor within the limits of healthy tissues. In case of involvement of ureteral orifice into timorous infiltrate or location of it near the tumor, together with resection of urinary bladder, transplantation of ureter into remained part of urinary bladder is performed (uretero-cysto-neostomy).

Radical cystectomy is standard of treatment of muscular-invasive tumors. Therewith in males, together with urinary bladder prostate gland is removed, while in females – uterus and anterior vaginal wall is resected. Urine diversion in case of cystectomy is possible by means of ureters transplantation:

- on skin (uretero-cutaneostomy)
- into isolated loop of intestines, which is exteriorized on anterior abdominal wall in the form of ileostoma (conduit)
- into formed from iliac or large intestinal isolated reservoir. This method is preferable, because patient controls continence and excretion of urine.

Transplantation of ureters into intestine or non-isolated reservoir nowadays is performed not often, due to a high risk of development of ascending pyelonephritis resulting from neglecting of intestinal content and often occurring metabolic disturbances, connected with intestinal absorption of urine.

Palliative surgeries: epicystectomy (in case of continence of urine, linked with extension of urinary bladder cervix with in-operable tumor). In case of a stable disorder of urine outflow from the upper urinary ways caused by squeezing of ureters with tumor, nephrectomy (puncture predominantly) or uretero-cutaneostomy is indicated. In advanced tumors of urinary bladder and uncontrolled bleeding, ligation of inner iliac arteries or performing of saving cystectomy is possible.

Conservative treatment consists of radiation and drug therapy. Radiation therapy as an independent treatment method in case of urinary bladder tumors is applied not often, in the main in case of inoperable tumors with palliative aim. More often this therapy is combined with surgical treatment.

Drug therapy (chemotherapy) as an independent treatment method is of little efficacy in case of urinary bladder cancer, but in combination with surgical and radiation treatment it may improve disease outcome. The most favorable results are obtained in combination of anti-tumor chemotherapeutic drugs (Methotrexate, vinblastin, adriablastin, cysplatine, hemcytabin).

Intravesical instillations of chemotherapeutic drugs – Doxorubicine amd Mytomicine-C in post-operative period are sufficiently effective in prophylaxis of relapses in case of superficial tumors. With the aim to treat urinary bladder cancer in situ, instillations into urinary bladder are applied.

Structural-logical scheme of content

EDUCATIONAL ELEMENTS		
1 order	2 order	3 order
Classification of renal tumors	Tumors of parenchyma Tumors of renal pelvis	Benign Malignant: Secondary (metastatic), benign,

		malignant, regional metastases
Metastasizing and spread	Spread of parenchymal tumors Implantation spread of renal pelvis tumor	Into the lungs, liver, bone metastases, brain metastases Spread into interior vena cava
General (extra-renal) symptoms	Worsening of general state, elevation of temperature, anemia, polycythemia, elevation of AT, varicocele	
Renal (local) symptoms	Hematuria Pain in the lumbar area Defining of neoplasm Atypical cells in urine	Painless, total, appears and disappears suddenly, character of blood clots, succession of development of hematuria and acute pain in the lumbar area
X-ray and radio-diagnostics	Significance of plain film, excretory urography, danger of retrograde pyelography. Renal angiography. Venocavagraphy	Deformation and replacement of renal calices or renal pelvis, “amputation” of calices, filling defect, replacement of urethra. Symptom of “lake, pool”
USI	US – signs of renal cell carcinoma	

Surgical treatment	Nephrectomy Nephro-ureterotomy with urinary bladder resection. Resection of kidney Enucleation of kidney	
Conservative treatment	Target therapy Immunotherapy Radiation therapy Chemotherapy	
Classification of urinary bladder tumors	Epithelial	Typical papillary fibro-epithelioma, Atypical papillary fibro-epithelioma, papillary cancer. Solid cancer
Metastasizing	Lesion of regional lymphatic nodes, remote metastases	
Symptomatology	Hematuria Disuria. Pain in the urinary bladder area	Total. Terminal Tamponade of urinary bladder with blood clots.
Diagnostics	Bimanual palpation Cytologic investigation of	Cystography, sedimental cystography, polycystography

	urine sedimentation Cystoscopy Endovesical biopsy X-ray investigation USI	Pricystography, excretory urography, pelvi-phlebography, pelvi-arteriography
		Endo-vesicular electrocoagulation Hemi-resection of urinary bladder with transplantation of urethra Transurethral electro-resection, trans-vesical electro-resection, resection of urinary bladder, cystectomy. Radiation therapy. Chemotherapy Immunotherapy (BCG).

Questions

1. Classification of renal tumors.
2. Metastasizing of parenchymatous renal tumors.
3. Renal and extra-renal symptoms of renal tumors.
4. Diagnostics of renal tumors.
5. Differential diagnostics of renal tumors.
6. Treatment of renal tumors.
7. Prognosis of adenocarcinoma.

8. Symptom complex and diagnostics of tumors of renal pelvis.

9. Classification of tumors of urinary bladder.

10. Symptom complex and diagnostics of tumors of urinary bladder.

11. Treatment and prognosis in case of tumors of urinary bladder.

Situation tasks (L=II)

1. Male patient, aged 48 was admitted to in-patient unit with complaints on fatigue, weakness, periodically occuring pains in the right hypochondrium over one year period. On palpation: in the right hypochondrium tumor-like formation, movable. Varicocele is in the right side, does not disappear in the supine position.

Diagnosis? What is necessary to do to precise diagnosis?

ANSWEAR: Tumor of the right kidney. To confirm diagnosis it is necessary to make X-ray investigation.

2. Female patient, aged 45 years was admitted to in-patient unit with complaints on elevation of temperature during 3 months, malaise, weakness, pain in the left hypochondrium, elevated AP. Objectively: paleness of skin integuments. In the left hypochondrium hard, motionless tumor-like neoplasm is palpable. In roentgenoscopy of stomach, it is located medial. On excretory urography defect of filling of renal pelvis and calices of the left kidney is seen.

Diagnosis? Treatment plan

ANSWEAR: Tumor of the left kidney. Nephrectomy is indicated.

3. Female patient K., 50 –years old was admitted complaining on macrohematuria, which appears suddenly. Kidney is not palpable. On cystoscopy: discharge of blood from orifice of the right ureter.

Diagnosis? Plan of examination.

ANSWEAR: Tumor either of right kidney or ureter. Urologic investigation is indicated.

Professional algorithm of examination of patients (record of patient's supervision):

Succession of actions	Knowledgeable fundamentals of actions	Self-control
On suspicion of renal blastoma		
Complaints and case history	Localization and character of pain. Presence of hematuria, its character (initial, terminal or total). Whether either patient himself or medical stuff palpated tumor-like formation in the abdominal area. Presence of hypertension, hyperthermia. Appetite, ability to work, loss of weight. Onset of appearing disease symptoms, their further development, initial examination and treatment.	
Objective study	Skin integuments. Severity of patient's state (activity, pulse rate and respiratory rate, AP). Inspection of abdomen. Palpation of kidneys in various positions (lying supine, lateral decubitus, upright position). Inspection and palpation of external genitals. To assess state of lymphatic glands.	Paleness or purple-cyanotic color of skin. Symmetry, presence of dilatation of subcutaneous veins. Whether bulky neoplasm is palpable, give its characteristics. Presence of varicocele.

Additional examination	USI	Presence of bulky neoplasm.
	Plain and intravenous urography.	Contours of lumbar muscles, renal shadows, presence of additional shadows, state of bones. Timely excretion of contrast substance, deformation, ЧМС, зміщення сечоводів.
	Aortography, renal selective arteriography, embolization of renal artery.	State of main artery, presence of pathologic vascularization or vascular-free zones In parenchymatous phase to determine homogeneity of accumulation of renal contrast, presence of "lake-symptom" and "pool-symptom". Presence of impression and timorous thrombus in the renal or inferior vena cava. Presence of remote metastases.
	Venography.	Presence of defects of contrasting. Invasive character of tumors, state of regional lymphatic glands.
	X-ray examination of lungs, bones of the pelvis and skull. Retrograde ureteropyelography. Computed tomography	
Diagnosis making on the basis of the data obtained		

Situation tasks (III)

52-year-old patient has palpable tumor-like formation, sizes 10 x 8 cm with dense tuberous surface in the right hypochondrium. On percussion: tympanitis

over the formation. Data of excretory urography do not give possibility for sure to rule out disease of the right kidney.

What methods of investigation give possibility to confirm or rule out urologic disease?

- 34-year-old patient has been working at enterprise of aniline colorings for years. Over the last 3-months period frequent, sometimes painful urination is observed. Periodically dull pain in the lower abdomen develops. Patient went to seek a doctor at skin and venereal diseases clinic. Specialists in skin and venereal diseases ruled out gonorrhea and trichomoniasis.

On objective examination (tomography including) pathologic changes were not revealed; leukocytes are 3-5 in the field of vision, erythrocytes are recent, 8-10 in the field of vision.

What disease may be thought of? What must be done to establish diagnosis?

- 62-year-old patient complains of periodic appearance of blood with clots in urine. Has been sick for 6-month period, the last 3 months has been feeling sharp pain in frequent urination. Nutrition is reduced, pale. Kidneys are not palpable. Pasternatsky's symptom is negative from both sides. On palpation over the pubis – moderate tenderness. Flow of urine is without changes. On rectal manual examination prevesicle gland, sizes 3x4 cm of soft elastic consistency is revealed.

What is initial diagnosis and plan of examination?

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Module № 1

Thematic module №3

Theme of the lesson Tumors of male genital organs.

Actuality of the theme

In the majority of cases (85-90%) tumors of male genital organs (TMGO) are malignant. By the data of WHO cancer of MGO occurs in 3-4% of all malignant neoplasms. In the world over the last years increase of incidence of TMGO is observed. Late revealing significantly makes treatment difficult and worsens prognosis. TMGO extends in Ukraine over the last years; this is linked with worsening of ecologic situation in the country, decrease of level of population's health, consequences of Chornobyl APS accident. Due to a high malignancy of TMGO role of radical surgical treatment increases; the latter is linked with chemotherapy, hormonal and radiation treatment and allows to prolong and improve patients' life.

Aim of the lesson:

Student must know:

-Clinical manifestations of benign hyperplasia and prostate cancer, tumors of testes.

- Complications of benign hyperplasia and prostate cancer, tumors of testes.
- Diagnostics of benign hyperplasia and prostate cancer, tumors of testes.
- Treatment benign hyperplasia and prostate cancer, tumors of testes.

Student must be able to:

- interpret clinical anatomy, physiology of organs of male genital system (material of lectures, textbooks, atlas).
- perform palpation of prostate, scrotal organs (patients).
- make scheme of investigation and explain results of additional methods of investigation in benign hyperplasia and prostate cancer, tumors of testes.

(material of lectures, textbooks, set of pictures, samples of analysis).

- to define principles of treatment techniques in patients with tumors, depending on the stage (material of lectures, textbooks).

Interdisciplinary integration

Disciplines	To know	To be able to
Anatomy Physiology Histology Pathologic anatomy	Anatomy of small pelvis organs; Physiology of prostate, testes; Histologic structure of prostate, testes; Histologic structure of various types of tumors.	To assess correctness of biopsy material taking for histologic examination; To be able to differentiate normal tissue from timorous (on macro-preparations).
Surgery	Pathogenesis, diagnostics and treatment of bleeding	To master rules of transfusion of blood-substitute solutions and blood
Radiation diagnostics	Procedures of ultrasonic and X-ray examination, CT and MRT	To interpret data of prostate US, CT та MRT of small pelvis
Oncology	Classification of TMGO, basis of oncologic peculiarities and regularity of malignant diseases	To define stage of the disease
Intra-disciplinary integration	Clinical picture and diagnostics of diseases of prostate, testes	To perform differential diagnostics against inflammatory diseases of prostate, testes and BHPG

Content of the lesson

Benign hyperplasia of prostate gland

Etiology and pathogenesis

Benign hyperplasia of prostate gland (BHPG) becomes more actual problem both in Ukraine and whole world. Risk of disease incidence growth with age, beginning from 45-th year of life and reaches the highest figures in elder age group, reaching the highest in the old age group (older than 85 years). So, patients over 50 fall ill approximately in 45-50 %, over 70 years - in 75-80 %.

Etiology of disease is not defined to the end, though it is known, that development of disease is linked with hormonal rebuilding of the male organism. Pathologic

changes in the organs and clinical manifestations are linked with infra-vesical obstruction, which is the cause of development of urinary retention. In future pathologic changes in the kidneys may develop, leading to the development of renal insufficiency. With joining of infection in urinary bladder and kidneys on the background of urinary retention, inflammatory and degenerative changes develop.

Classification.

1-st stage: increase of prostate in sizes, dysuria disturbances, urodynamic lesions of lower urinary ways in preserved function of bladder detrusor (amount of residual urine - to 50 ml).

2-d stage: increase of prostate in sizes, dysuria disturbances, (nicturia, stranguria, imperative urges), marked urodynamic lesions of lower urinary ways in decreased function of bladder detrusor (amount of residual urine – more than 50 ml).

3-d stage: increase of prostate in sizes, dysuria disturbances, (nicturia, stranguria, imperative urges), marked urodynamic lesions of lower urinary ways in decreased function of bladder detrusor (amount of residual urine – more than 250 ml) and upper urinary ways with the signs of renal insufficiency, paradoxical ischuria.

Diagnostics

Among all investigations and testes, used in BHPG, first of all it is necessary to mention digital rectal investigation (DRI) of prostate, being the most simple and cheapest diagnostic test. Due to this fact it remains the most prevalent, despite development of new, more precise diagnostic methods. Method consists of transrectal palpation of prostate. BHPG is defined as homogeneity of gland consistency, increase of its sizes, clear contours, smoothing of interparticle sulcus. Despite of being simple, this method requires define experience in assessment of results.

Sonography is an important method in diagnostics of BHPG. In the main with this aim two types of ultrasonic investigation (USI) are used: suprapubic with filled urinary bladder and transrectal. USI is successfully used in defining amount of residual urine and diagnostics of urethohydronephrosis and other complications of BHPG.

Important task in examination of patients with symptoms of BHPG is differential diagnostics of this disease against prostate cancer. For this purpose markers are used. Prostate specific antigen (PSA) is the most widely used.

PSA was discovered and isolated in 1970 years. In its nature it is glucoproteid with molecular mass of 34 κ. It is specific for epithelial cells of prostate ducts and does not form in other tissues of the organism and tumors. PSA also has marked immunogenic peculiarities, on their basis precise methods of its defining radio-immune and immune-enzyme are developed. Normal level of PSA in blood serum depending on methods of its defining is 1,5-3,0 ng/mol. PSA is not formed in women. It is observed increase of its level in 70-95% of patients with prostate cancer and marked positive correlation with stage of process, level of tumor differentiation and treatment efficacy. Sensitivity of this method is 65-88%, specificity – 42-90%.

CT (computed tomography) and MRT (magnet-resonance tomography) are used in diagnostics. But in case of BHPG these methods have intermediate significance.

Treatment

On the initial stage of the disease conservative treatment is used successfully. Prevalent majority of agents, developed for treatment of BHPG do not have proved impact on adenomatous tissues directly. However, they effectively eliminate symptoms and simultaneously significantly improve quality of life f these patients. The most active in this direction are agents of group of alpha-adrenoblockers. They block receptors in cystic cervix and eliminate symptoms of its irritation. Besides, these agents lead to relaxation of smooth muscles of cystic cervix and prostate, their shortening together with mechanic pressure on urethra of adenomatous tissues complicates urination. This favors not only subjective improvement of patient's state, but change of such objective parameters as increase of urination rate, decrease of amount of residual urine, decrease of risk of development of acute urinary retention as well. Blockers of 5-α-reductase are able to decrease prostate size at the expense of adenomatous component, and to inhibit growth of prostate.

Trans-urethral resection of prostate (TURP) is the most often used method of surgical treatment. In the volume of prostate more than 80 cm^3 prostatectomy is performed. In case of a severe state of a patient, caused by development of BHPG

complications, with the aim of temporary taking of urine, constant urethral catheter or suprapubic cystostoma are used.

Prostate gland cancer (PGC)

Epidemiology, etiology, pathogenesis

Incidence of PGC in Ukraine and in the world continues to grow. Over the last 6 years in Ukraine it grew from 10,9 to 12,8 per 100 000 of population, therewith cancer of III and IV stage is observed in 55 % of patients.

Causes of PGC are not clear in the full, but data of experimental and clinical investigations testify that pathology is caused by impairment of endocrine regulation of balance of sexual hormones.

Pathologic anatomy and classification

In the prostate gland it is conventionally to distinguish posterior and lateral lobes. The most often timorous foci are revealed in posterior part – 53,6 %, in lateral parts – 38,5 % and the most rarely in the anterior part – 7,9%. The most prevalent variants are: renal cell tubular-alveolar carcinoma 24,8%; chromophobe tubular carcinoma – 19,4%; anaplastic adenocarcinoma – 14,5%.

Symptom complex

On the initial stages course of the disease is free of symptoms.

In the advanced stages it is observed

- dysuria;
- hematuria;
- pains;
- disorders of defecation;
- renal insufficiency

Diagnostics:

Diagnostics of PGC includes patient's complaints, thoroughly taken anamnesis, palpation, digital rectal examination. Revealing of increased PSA in the blood and acid phosphatase. Plain X-ray examination, KT, MRT osteoscintigraphy. Ultrasonic transrectal and transabdominal investigation. Puncture biopsy of tumor.

It is important to define stage of tumor, its localization, spread and invasion, presence or absence of regional and remote metastases. It is the task of diagnostics to assess state of upper and lower urinary excretion ways. It is necessary to define stage of operation risk and solve the question of patient's operability, to choose treatment method.

Treatment:

Surgical methods are leading in treatment. Radical prostatectomy, palliative surgeries, castration, hormonal therapy (agonists (antagonists) of gonadotropic releasing-factor, anti-androgens, estrogens), radiation therapy, chemotherapy.

Testicle cancer

Epidemiology, etiology, pathogenesis

Testicle cancer makes up approximately 1–1,5% of all malignant neoplasms in males. This is the most prevalent cancer, affecting young males of the third-forth decade of life. Causes of development of these tumors are not clear in full, but it is known, that risk of development of testicle tumors increases many times in children with timely not treated cryptorchism, traumas of testes, Kleinefelter's syndrome, after action of ionizing radiation. During the last decades stable growth of testicle cancer incidence is observed. The majority of these tumors come from germinogenic cells (seminomal and non-seminomal germinogenic cancer of testis), in more than 70% of patients I stage of disease is diagnosed.

Pathologic anatomy and classification

Epithelial testicle cancer may be divided into three categories: a) germinogenic tumors (seminoma, embrional carcinoma, choriocarcinoma, teratoma, tumor of yolk sac) b) tumors of sexual stroma (tumor from Leidigh's cells, tumor from Sertoli's cells, granular-cell tumor) c) mixed germinogenic/stromal tumors. According to classification germinogenic tumors make up 90-95% of all testicle tumors.

Symptoms

The most often symptoms of testicle tumors is induration of testis in the form of node, as a rule one-sided. As tumor grows, pain in the testis along spermal cord

may join. In 10% of cases dropsy of testicular membranes joins. Hormonal activity of some testicular tumors causes changes of secondary genital signs. In 5-10% of cases growth of breasts gynecomasty) is observed. If testosterone produces testicular tumor (male sexual hormone), in boys pubertas precox begins.

Diagnostics

Making diagnosis of testicular tumor is based on: clinical examination of testis and general physical examination. Examination of lymphatic nodes of peritoneal cavity, mediastanium and inner organs (CT) and subclavicular lymphatic nodes (physical examination). Suspecting presence of metastases, other investigations, such as CT of the brain and spinal column, scintigraphy of bones or USI of the liver, CT of thorax should be done. Defining of level of tumor markers of cancer-embrional antigen (CEA), a-phetoprotein, human chorionic b gonadotropin and lactate-dehydrogenase before orchiectomy is performed.

Treatment

Revision of groin area and orchiectomy with removal of testis, protein membrane and spermatic cord by one block. In some cases (lesion of both or one testis by tumor) in specialized centers it is possible to perform organ-saving surgery. Radiation therapy, chemotherapy. Retroperitoneal lymphadenectomy.

Structural and logical scheme of the theme content

Hyperplasia of prostate		
Etiopathogenesis	Hormonal rearrangement of male organism Increasing of transitory zone of the prostate Infravesical obstruction	
Classification	I-stage of compensation II- stage of subcompensation III- stage of decompensation	

Symptoms	Pollakiuria Nycturia Stranguria Enuresis Acute urinary retention Chronic urinary retention Paradoxical urinary retention	
Diagnosing	Prostatic specific antigen (PSA),palpation, ultrasound examination X-ray examination,CT MRT	
Treatment	Conservative Surgical	Alpha-adrenergic blocking agent Blocking agent of 5-α- reductase Transurethral resection of the prostate (TURP) Prostatectomy
Testicular cancer		
Classification	Germinogeneous tumours Tumours of gonadal stroma. Other tumours	Seminoma Tumours of vitelline sac Embryonic carcinoma Chorionepithelioma. Teratoma. Mixed tumours. Leydig cells tumours. Sertoli cell tumours. Gonadoblastomas. Mixed tumours. Epidermoid cyst. Adenomatous tumours. Adenocarcinoma of rete testis. Carcinoid.
Symptoms	Painless increasing of consolidation, tuberosity of the surface	
Diagnosing	PSA, palpation, ultrasound examination, CT, MRT, X-ray examination, biopsy	

Treatment	*Orchofuniculectomy,* M. Chevassu operation. Radiation therapy. Chemotherapy.	
Prostate cancer.		
Etiopathogenesis	- carcinogenic substances in the organism; - environmental aspect; - disorder of endocrine regulation.	
Classification	Epithelial Nonepithelial Mixed	adenocarcinoma scirrhus, solid carcinoma, epidermoid cancer. Leukomyoma, leukosarcoma, rhabdomyosarcoma, hemangioma, hemangiosarcoma, hemangiopericytoma, neurofibroma etc. Cystoadenoleiomyofibroma . phylloid cystisarcom
Symptoms	- dysuria; -hematuria; - Disorder of defecation; - pains; - renal insufficiency	
Diagnosing	Palpation. digital rectal investigation. X-ray examination. Ultrasound examination. Biopsy of prostate. PSA, CT, MRT, osteoscintigraphy	CT, plain urography, urethrocystography, transabdominal and transrectal USE
Treatment	Surgical Conservative	Radical prostatectomy cystostomy, TURP, hormonal therapy, radiation therapy. Systemic chemotherapy

Questions:

1. What are the main aetiological factors of male genital tumours (MGT) development?
2. What is morbidity of MGT?
3. Could you state histological classification of MGT?
4. What are the most frequent histological cancer types of MG?
5. What are main patient's complaints in prostate tumours, testicular cancer, and hyperplasia of prostate?
6. What methods of examination are used for diagnosing of MGT?
7. What surgical procedures are used for treatment of the patients with MGT?
8. What preparations are used for treatment of the patients with prostate cancer, hyperplasia of prostate?

Test tasks of the II level:

1. What is the sequence of your actions in examination of the patient with macrohematuria?

1. Cystoscopy.
2. Plain and excrectory urography.
3. Computer tomography.
4. Ultrasound diagnosing.
5. Three-glass test
6. a) 2. 4. 1. 5. 3;
7. * b) 5. 4. 1. 2. 3;
8. c) 1. 2. 4. 3. 5;
9. d) 5. 4. 3. 2. 1.

2. State surgical manipulations used in treatment of prostate cancer:

a) transurethral resection of the prostate;
b) radical prostatectomy;
c) cystostomy;
d) nephroureterectomy;
e) *orchofuniculectomy*;
f) partial cystectomy

The model of the answer: a, b, c.

3. State the most important prognostic factors involving aggressive potential of the prostate tumour;

a).....

b).....

c).....

The model of the answer:

а) Degree of differentiation of tumor cells;

б) tumour stage;

в) presence of nodes and metastases

4. In what cases will you perform radical prostatectomy:

a) TI N0 M0;

b) T3 N0 MO;

c) T4 N3 MI;

d) T2 N1 MO;

e) T2 N0 M1;

f) T2 N0 MO.

The model of the answer: a, d, f

5. What is the most effective group of preparations for hormonal therapy of prostate cancer?:

a) antiandrogens;

b) estrogen;

c) gonadotropin-releasing factor agonists

The model of the answer: c

6. What symptoms are not characteristic for prostate cancer?

a) dysuria;

b) macrohematuria;

c) pain above the supracubic;

d) pains in testicles;

e) pains in epigastric.

The model of the answer: d, e.

7. What diseases should we differentiate prostate cancer with a)..., b)..., c)..., d)..., e)...

The model of the answer:

a) cystitis;

b) chronic prostatitis;

c) Benign prostatic hyperplasia (BPH);

d) sclerosis of prostate;

e) gallbladder cancer

Situational tasks of II level

1.A 65-year-old patient noticed the presence of dysuria and pains at the end of urination two weeks ago. Prostate cancer T2 NO MO was diagnosed in the patient by the findings of USE, digital examination, the level of prostate-specific antigen, biopsy. What is your therapeutic approach? The model of the answer: Radical prostatectomy with the following hormonal therapy.

2.Prostate-specific antigen 23,2 kg/ml was determined in a 50-year-old patient B. Prostate was tuberous and dense in X-ray examination. What disease can you think of?

The model of the answer: Prostate cancer.

What is a plan of examination?

The model of the answer: USE, biopsy, RO-graphy of the chest organs. There is osteoscintigraphy, MRT o*r CT* in cases of suspected tumor

Professional algorithm of patient examination

Task	Approximate basis of actions	Self control
To find out the complaints and case history	Localization and nature of the pain. Time of appearance of the first signs, the nature of urination	
Objective examination	To estimate the patient's condition. To perform digital examination of the prostate through the rectum. As well as examination and palpation of male genital organs	The pulse, blood pressure, RR. Enlarged prostate gland that has dense chondroid or bone-like consistency may be palpated.
Laboratory findings	Complete blood count, complete urinalysis, biochemical examinations. Determining of PSA level in the blood, chorionic gonadotropin, alpha - fetoprotein	The number of leukocytes, leukogram, the number of erythrocytes, hemoglobin, ESR, urine pH, protein, erythrocytes, leukocytes. Urea, creatinine.
Findings of extra diagnostic measures	X-ray, CT, USE, MRT. Biopsy. Osteoscintigraphy	Plain urogram. Excrectory urogram. Cystography. Vesiculography.
Determining of the initial diagnose	To make a diagnose of the main disease, its complications, presence of other urological diseases, accompanying pathology	
Treatment plan	Surgical. Conservative.	Radical prostatectomy, cystostomy, TURP, J. Ducuing operation, M. Chevassu operation. Hormonal therapy. Radiation, systemic chemotherapy

Situational tasks of the L-III.

A 65-year-old man took a medical advice at the reception ward complaining of dysuric disorders, discharge of blood with urine at the end of urination. Enlarged, heterogenous prostate, signs of left side ureterohydronephrosis II were revealed during examination. .

Initial plan of examination and treatment.

The model of the answer:

Excretory urogram, X-ray of the lungs, bones of pelvis, CT or MRT must be done. Prostate specific antigen. Biopsy of the prostate. Based on the conditions of the problem, the patient has got tumor of the prostate. Surgical treatment i.e. radical prostatectomy is administered to the patient.

Test tasks L - III.

Symptoms	BPH	Inflammatory diseases of the prostate gland	Gallbladder cancer	Prostatic cancer
pain above the supracubic	-	+	+	+
Pains in the perineum	-	+	-	+
Macrohematuria	+	+	+	+
Leukocyturia	-	+	-	-
Dysuric disorders	+	+	-	+
Increasing of ESR	-	+	+	+
Changes in USE	+	+	-	+
Residual urine	+	-	-	+
Increasing of the PSA level	-	-	-	+
Changes in DRE	+	+	-	+
Changes in USE	-	-	+	+

* DRE– Digital rectal examination

Stages of the disease	Stage TI	T2	T3	T4
Radical prostatectomy	+	+	-	-
Castration. Hormone therapy			+	+

Palliative operation. Radiation therapy			+	+
M. Chevassu operation. Orchofuniculectomy.	+	+	+	+
Chemotherapy	+	+	+	+
Radiation therapy.	+	+	+	+

Approximate map for the independent work with sources.

Main tasks	Instructionsf or the training actions
To learn: 1. Epidemiology of MGT	To characterize the level and dynamics of MGT morbidity
2. Reasons of MGT development	To name etiological and pathogenic factors of MGT development
3. Classification of MGT	To list the main kinds of classification
4. General and local symptoms of MGT	To list the main general and local symptoms of MGT
5. Extra methods of examination of the patients	To give a list of the leading extra laboratory and instrumental methods of the patients' examination
6. Main complexes of treatment of the patients with MGO cancer	To make up typical schemes of the patients' treatment

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Module # 1

Thematic module # 2

Theme of the lesson Specific inflammatory diseases (tuberculosis of the organs of urogenital system)

Topicality of the theme

Renal tuberculosis, tuberculosis of bile ducts and tuberculosis of male genital organs is one of the most serious urological diseases. It takes the first place among extrapulmonary TB.

In clinical practice all urogenital organs without exception can be involved with tuberculosis. Tuberculosis most often affects kidneys and epididymis among male genital organs.

About 1 billion people of the world are infected and 10 million people having clinical signs of tuberculosis consult a doctor annually. 20% of cases of extrapulmonary tuberculosis is renal tuberculosis. Difficulties of diagnosis, the tendency to spread of urogenital tuberculosis determine the topicality of the given theme.

Learning aims.

A student must know:

Main factors of tuberculosis etiopathogenesis.
Clinical and radiological classification of tuberculosis.
Data of physical, laboratory, radiographic, ultrasonic methods of examination.
Differential diagnostic of tuberculosis with other diseases.
Principles of tuberculosis treatment.
A student must be able to:

- Analyse the causes of the disease (lecture materials, textbooks).
- Interpret methods of clinical examination (past history, samples of analysis), data of laboratory examination (patients, samples of

analysis).

- Interpret the results of of X-ray, ultrasound, radionuclide methods of examination (set of images).
- Make a scheme of examination and treatment of the patients with tuberculosis of urogenital system organs (lecture materials, textbooks).
- Determine the principles of therapeutic approach in tuberculosis of urogenital system organs (lecture materials, textbooks).

Practical skills assigned to practical lessons:

Rules of performing and assessment of cystoscopy and chromocystoscopy results (dummy, atlas)

Intersubject integration.

#	Subject	You should know	You should be able to
1	Therapy	Low lobe pleuropneumonia	Perform differential diagnostics with listed diseases and tuberculosis of urogenital system organs Interpret all methods of examination correctly: - laboratory; - X-ray; - radioisotopic; - ultrasonic etc.
2	Surgery	Acute and chronic - cholecystitis - pancreatitis - ulcer	
3	Gynecology	Acute and chronic - adnexitis	
4	Infectious diseases	- typhus - malaria - leptospirosis	
5	Nervous diseases	- osteochondrosis - radiculitis	

Content of the theme of the lesson

Severe forms of primary tuberculosis develop in children and adults in conditions of unfavourable effect of environment that decreases body resistance, hunger, exhausting physical labour, and poor living conditions. It occurs among the social and unsecured population.

Due to the accident at the Chernobyl nuclear power plant there is evidence that suggests that the reduction in radiation exposure of cellular and humoral

immunity may be one of the factors that contribute to the development of tuberculosis in the body as a result of endogenous reactivation.

Tuberculosis of the genital organs - secondary, so-called organ tuberculosis. It develops in many years after the first clinical manifestation of tuberculosis. Urogenital tuberculosis occurs mostly in age of 20-40 years old. The main channel of spread of tuberculosis infection is hematogenous. First the kidneys are affected, and from there the infection enters through the blood vessels in renal pelvis, bladder, ureter.

In early stages of the disease general weakness, malaise, early fatigue, weight loss, loss of appetite, dull pain in the lumbar area, subfebrile body temperature are sometimes observed.

Changes of epididymis, thickening of spermatic cord are observed in physical examination of men.

Changes in blood are not specific for tuberculosis. Most often there is leukocytosis with shift of leukogram to the left and slight decreasing of eosinocytes number. Lymphopenia and hypochromic anemia may occur. The patients with tuberculosis have acid urine reaction, moderate proteinuria, pyuria, microhematuria.

Provocation test, i. e. 15-20 tuberculin units are injected subcutaneously to reveal pathologic elements, micobacteria. Leukocyturia and erythrocyturia are intensified in tuberculosis. Tuberculosis of male genital organs has chronic course, only tuberculosis of epididymis occurs in acute form. The patients have pain in the corresponding half of the scrotum, scrotal swelling and redness, increased body temperature to 39 ° C.

Chronic form of the disease begins unnoticed and takes its course asymptomatically. A little painful compression, which increases gradually, appears in epididymis. The process extends to spermaduct, and then to the egg. Epididymis unites with skin in the rise of infiltration.

The most reliable and objective evidence of tuberculosis of urinary organs are sowing of Mycobacterium tuberculosis from urine sediment. Bacterioscopic, bacteriological and biological methods of examination are used for it.

Radiological methods of examination are used to reveal morphological and functional changes in a kidney.

Single and multiple foci of calcification or shadow of sclerosed ureter can be found in a plain urogram.

Petrificates in the kidneys, strain and even destruction of the parenchyma, enlargement of cups are observed in excretory urography. Ureters can be narrowed. The bladder volume is reduced. The most informative method of diagnosis of tuberculosis of the bladder is cystoscopy. Small pale yellow or gray-yellow tubercular protuberances can be revealed at the urethral orifice of the affected kidney. Urethral orifice is inverted, deformed, it gapes.

Treatment of the patients with tuberculosis of the urinary system includes both conservative and surgical measures. The volume of treatment depends on the stage of the pathological process.

Resection of the kidney, nephrectomy, nephrostomy can be performed in surgical treatment. Application of anastomosis in different parts of the ureter, or its replacement by small intestine can be also performed. Intestinal plastic surgery is performed in case of contracted bladder.

Conservative treatment must be prolonged and continuous. Absence of changes in urine composition during 5 years after completion of treatment and positive dynamics of immunological, radiological and X-ray indicators indicates about a complete recovery.

Structural and logical scheme of the theme content.

Specific inflammatory diseases

(tuberculosis of the organs of urogenital system)

Learning elements		
Of the first order	Of the second order	Of the third order
Etiopathogenesis	Type and nature of microbial flora. Ways of penetration of pathogenic flora into the kidney. Changes in immunobiological reactivity	Mycobacteria of tuberculosis Hematogenic
Clinical picture and diagnosis	Subjective and objective signs. Urine analysis. Instrumental studies. USE. Radiological and X-ray diagnostics	Weakness, pain, dysuria. Revealing of "sterile" leukocyturia. Chromocystoscopy. Catheterization of ureters. Radiological signs. Radioisotope renography, scintigraphy, scanning
Treatment	Conservative Surgical	Specific antituberculous drugs. Dietotherapy. phytotherapy. sanatorium-and-spa treatment. Mobilization of host defenses.. Elimination of stasis of urine, kidney resection or nephrectomy.

Questions:

Progress test	
1. Tell what is the way of penetrating of mycobacterium of tuberculosis in tuberculosis of the kidney.	1.Hematogenic 2.Changes in urine passage.
2. Tell the classification of kidney tuberculosis	1. Undestructable infiltrate 2. Initial destruction (papillitis) 3. Limited destruction (cavernous) 4. Total destruction, pyonephrosis
3. List the main methods of examination of tuberculosis of the organs of urogenital system.	1. Past history of the disease 2. Clinical examinations 3. Laboratory studies 4. Endovesical examination 5. Endoscopic examination
4. Endicate the main symptomatics of kidney tuberculosis	1. Backache 2. Hematuria 3. Dysuria 4. Pyuria
5. Specify the diagnostic methods in tuberculosis of the urinary system	1. Bacterioscopic 2. Bacteriological 3. Biological 4. Biopsy

6. List the methods of X-ray studies of kidney tuberculosis	1. plain urogram 2. Excretory, infusion urography 3. Retrograde, antegrade pyelography 4. Angiography 5. Radioisotope X renography 6. Scanning 7. Cystography
7. Name the most pathological changes in urine	1. Strong acid reaction of urine 2. Pyuria 3. Hematuria 4. Proteinuria 5. Sow of mycobacteria
8. List the main methods of treatment	1. Conservational 2. Operational 3. sanatorium-and-spa
9. Point the methods of treatment: a) conservational b) surgical c) sanatorium-and-spa treatment	1. Antibacterial, tuberculin therapy with hormones and vitamins a) organ saving : kidney resection, cavernotomia, cavernoektomia; b) reconstructive – Saving operation of Boari – the plastic of pelvic-ureteral segment; c) nephrectomy 1. Shefronovo 2. Glukhovska 3. Pioneerska 4. Southen Coast of Crimea, Alupka, Sonyachne

The structure of the lesson

The sequence of actions	Approximate base of actions	Self-control
Complaints and anamnesis	Was the patient sick before with tuberculosis. Did the patient have the contact with TB patients? Complaints Living conditions, food Is there dysuria, the effectiveness of anti-inflammatory therapy	Weakness, subfebrilitet
Objective research	Palpation of the kidney Pasternatsky's symptom Rectal examination examination of the scrotum	

Additional examination	Urinalysis Complete analysis of blood Cystoscopy Plain urography Excretory urography, retrograde ureteropiyelohraphy Cystography	Aseptic pyuria, acidic urine, proteinuria, microhematuria, detection of mycobacterium of tuberculosis. Lymphocytosis Tubercle of tuberculosis (miliary formation of crown hyperemia). Foci of calcification disorder of the discharge of contrast, deformation pelvic-calicial system, amputation of cups, the presence of caverns, enlargement of the ureters, microcyctes
Set a diagnosis	The stage of the process (X-ray classification)	
The choice of the medical tactics	Conservative therapy. The surgical intervention. Recommendations	

Task 1 (L - III)

The patient S. 40 years old has the disease which began with the dull pain in the sacral area. He had sweating, performance loss, low-grade fever. There is tuberculosis of cervical vertebrae in the history of disease. The patient was treated. Then he has been discharged from the dispensary ward. There is leukocytes which cover the field of view in urine, the protein 1.0, the reaction of urine is acidic.

Diagnosis? Research efforts.

Standard solutions

We can consider about the tuberculosis of the kidney. It is necessary to make the excretory urography, urine analysis (several times), cystoscopy.

Task 2 (L - III)

2. The patient was treated in hospital because of the kidney tuberculosis. At this time the patient has the complaints of the frequent painful urination with small portions. There is the presence of nebulous urine and it was found Koch mycobacteria in urine analisys.

Diagnosis? Research efforts.

Standard solutions

Tuberculosis of the kidney and the bladder. For the further diagnosis it is necessary to make endoscopic studis, excretory urohraphy and cystogram.

Task 3 (L - III)

3. The patient K. had acute epididymitis2 years ago. At this time he has the complains of the presence of purulent hollows of scrotum. In the palpation of hills in the area of application testicular involved fistulas, the skin of scrotum is soldered to the application.

Diagnosis?

Standard solutions

Probably it can be tuberculous epididymitis. To clarify it is necessary to make some X-ray roentgenogram of the lungs, excretory urogram, plating analysis of urine, secretions of the prostate. Punctate of suspicious foci for biopsy. (Tuberculous epididymitis).

The approximate map for the independent work of students with literature.

№ з/п	Tasks	Instructions to the task	Independent records of students
1	Causes of tuberculosis of the genitourinary system	Write etiologic and pathogenetic factors that may cause tuberculosis of the genitourinary system	
2	Classification of tuberculosis	Clinical and radiological classification	
3	Diagnostics of tuberculosis	List the main methods for examination of the patients with tuberculosis of the urogenital system. Specify what method of research is important in the diagnosis of tuberculosis of the bladder	
4	Complications of tuberculosis	List the possible complications.	
5	Differential diagnostics	Name the disease that may simulate tuberculosis clinic of the genitourinary system	
6	Treatment of tuberculosis of the genitourinary system	Make the treatment regimen of the patients. List what operations are performed in tuberculosis of the genitourinary system	

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