MINISTRY OF HEALTH OF UKRAINE
"Ukrainian Medical Stomatological Academy"

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The Head of the department
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METHODICAL INSTRUCTIONS

FOR STUDENTS` SELF-WORK

WHILE PREPARING FOR PRACTICAL LESSONS

Educational discipline	Pediatric Surgery
module №3	Urgent Pediatric Surgery
Theme of the lesson	Trauma to the urinary tract. Scrotal edema syndrome. Urolithiasis.
Course	V
Faculty	foreign students preparation

POLTAVA 2020

1. The topic basis: the topic "Trauma to the urinary tract. Scrotal edema syndrome. Urolithiasis." is very important for future doctors in their professional activity, positively influences the students in their attitude to the future profession, forms professional skills and experience as well as taking as a principle the knowledge of the subject learnt.

2. The aims of the training course:

1. To define anatomic structures which are subject to damage.
2. To select and group clinical signs, which characterize contusion of soft tissue, signs which denote bleeding and signs which denote the break of organs of the urinary system.
3. To illustrate clinical signs taking as an example a patient with a traumatic damage and to formulate a previous diagnosis, define the state of the patient, availability of shock.
4. To differentiate a damage depending on the anatomic structures of the genitourinary systems : contusion, abruption, complex trauma.
5. To work out a plan of inspection and interpret the auxiliary methods of research: USD, X-ray, urography, ureterography, CT etc., laboratory and biochemical analyses, indices of haemodynamic.
6. To describe techniques of catheterization of urinary bladder and suprapubic puncture of urinary bladder.
7. To identify the features of course of separate damages of the genitourinary systems.
8. To analyse the cause-effect relationships of an urinary tract damage and characterize its basic complications: bleeding, urinary leakage.
9. To offer the algorithm of the actions of the doctor at traumatic damages and define tactics of their treatment.
10. To provide urgent medical help at the basic urinary tract damage in children and to execute necessary medical manipulations.
11. Determine indications for operative interventions depending on the type of the damage: sewing, cystostomy, nephrostomy, drainage of paravesical and paranephric space, paraureteral haematoma, nephrectomy, heminephretemy, perineotomy, scrototomy, orchidotomy. To master the basic theories of stone formation and pathogenesis of urolithiasis.
12. To recognize the basic clinical manifestations of urolithiasis depending on the age of the child; size and location of the stone, availability of infection.
13. To differentiate urolithiasis depending on the level of stone location.
14. To interpret the auxiliary methods of research (US-diagnostic, X-ray excretory urography, pneumocystography and ascending urography), laboratory and biochemical analyses.
15. To demonstrate pulpation of lumbar area, catheterization of urinary bladder, describe composition of urine and composition of stone.
16. To identify the features of clinical course of separate diseases of the urogenintal system accompanied by renal colic.
17. To analyze cause-effect relationships of pain and macrohaematuria for separate patients, to ground and formulate a previous clinical diagnosis.
18. To offer the algorithm of action of the doctor at a renal colic and tactics of treatment.
19. To interpret general principles treatments of diseases of the urogenintal system accompanied by renal colic, the syndrome of haematuria and to define indications for surgical treatment.

3. Basic knowledge, skills, habits necessary for studying the subject (interdisciplinary integration).

Names of previous disciplines	Obtained skills
1. Anatomy	Identify and describe the anatomical structure of the genitourinary system in children.

2. Pharmacology	Identify and apply symptomatic therapy for diseases of the genitourinary system and when providing emergency care for trauma to the genitourinary system
3. topographic anatomy	To depict schematically the anatomical structure of the genitourinary system and the main types of surgical interventions on the genito-urinary organs.
4. Operative surgery	To depict schematically the topography of the genitourinary systems, urinary bladder
5.Propedeutics of childhood diseases	Identify and apply the basic methods of objective examination of children with diseases and trauma of the genitourinary system.
6. Radiology	To make an x-ray study, to evaluate the results obtained, to determine the basic radiographic symptoms. Evaluate the data of ultrasound, computed tomography depending on the nature of the pathology

Thereotical questions for the lesson:

1. What is important to discover at a patient with the traumatic damage of the urinary tracts?
2. What changes can be found out at palpation of lumbar region at the trauma of kidhey?
3. What is the previous diagnosis of traumatic damage of kidhey based on?
4. What methods will help in diagnostics of trauma of kidhey?
5. Peculiarities of physical examination of children with the trauma of urinary bladder and urethra?
6. What is necessary to discover at a patient with the traumatic damage of urinary bladder?
7. What principles is the list of damages formed for the differential diagnostics at the traumatic damages of pelvic bones and organs of small pelvis?
8. Name the most reliable methods of diagnostics used at trauma of urethra.
9. Peculiarities of physical examination of children with the trauma of scrotum.
10. Define medical tactic at patients with the traumatic damage of the urinary tract.
11. Name the main factors which can result in development of urolithiasis.
12. What are the most characteristic clinical manifestations of urolithiasis?
13. What is the previous diagnosis of urolithiasis based on?
14. What diseases require differentiating renal colic?
15. What is important to define at forming medical tactic at patients with an urolithiasis?
16. What main methods of diagnostics will help at determination of diagnosis of urolithiasis?
17. What diseases are incorporated in the group of scrotal edema syndrome?
18. Name clinical manifestation of scrotal edema syndrome.
19. What are the complaints of patients at the scrotal edema syndrome?
20. What diseases require differentiating the scrotal edema syndrome?
21. What symptoms can be defined at the scrotal edema syndrome?
22. What is the previous diagnosis of scrotal edema syndrome based on?
23. What is important to define at forming medical tactic at patients with acute orchiepididymitis, torsion of the hydatid of Morgagni, torsion testis and acute hydrocele of testis?
24. What complications can arise at the scrotal edema syndrome?

4. Maintenance of the subject:

TRAUMA TO THE URINARY TRACT

KIDNEY

The most common causes of renal injury are participation in sports and automobile accidents. In the latter, multiple injuries involving head, chest, limbs and other abdominal organs may temporarily direct attention away from renal trauma. Gross hematuria is the most frequent manifestation; clots in the renal pelvis and ureter may cause renal colic, and there may be oliguria as a result of obstruction. Intravenous urography should be done as soon as possible; this may demonstrate the site of injury, extravasation of contrast medium into the perirenal region, clots in the renal pelvis or ureteral obstruction, or there may be nonvisualization of a pole of the kidney. Delay in carrying out the intravenous urogram can be dangerous because, if there is continued renal bleeding, it is critical to know the site and extent of injury. Renal isotope scan and arteriography may also be useful, particularly if there is nonvisualization of the kidney on the urogram.

In most instances a conservative approach is warranted. Attention should be given to the replacement of blood loss and to recognition and treatment of infection and obstruction. Indications for exploring a renal injury are limited mainly to rapid deterioration from extensive loss of blood or to removal of an infected hematoma. The extravasation of urine from the kidney into the surrounding area is itself a matter of little consequence. A progressive increase in the size of a perinephric hematoma may be an indication for surgical drainage, particularly if it causes displacement of the kidney. The incidence of nephrectomy should be less than 4 per cent. Hypertension is an important complication; it occurs in about 15 per cent of patients and may be manifest in the immediate days or weeks following trauma or may not appear until several months to years later.

Minor renal trauma may cause hematuria in children with underlying developmental abnormalities of the urinary tract, in particular in those who have obstructive uropathy with hydronephrosis.

BLADDER AND URETHRA

Rupture of the bladder is a relatively common complication of a fractured pelvis; about 10 per cent of patients with a ruptured bladder have an associated tear of the posterior urethra.

Rupture of the urethra can be suspected if there is failure to pass urine and if there is blood at the urethral meatus. Introduction of a urethral catheter in such patients can aggravate the urethral tear, which in posterior urethral rupture is often only partial. Instead of immediately inserting a catheter in an attempt to drain the bladder, observation for 12 to 24 hours is recommended to determine whether the bladder will distend or the patient will void spontaneously. If the latter occurs, there is the possibility of spontaneous repair.

Insertion of a catheter in suspected cases of urethral rupture increases the possibility of introducing infection and may sever a residual strand of mucosal tissue bridging the margins of the tear. If the bladder distends, suprapubic drainage can be instituted. After several weeks the urethra can be inspected by an experienced endoscopist to determine the site of urethral rupture. An important and often late complication is a urethral stricture. Foreign body reaction and infection caused by an indwelling catheter increase the likelihood of late urethral structure.

TORSION OF THE TESTIS.

Increased mobility of the testis may result in an axial twist with ensuing torsion of the spermatic cord and interference with its blood supply. Torsion of the spermatic cord almost always results in infarction and necrosis of the testi's if it is not corrected within 24 hours of occurrence. The condition may be present at birth or occur at any age; it is usually unilateral, but may be bilateral. The pathogenesis is not clear; it is believed that there is usually an underlying anatomic abnormality, such as a long mesorchium and an abnormal reflection of the tunica vaginalis; this defect is usually bilateral.

The clinical manifestations are variable. In the neonatal period there are often no symptoms, and the presenting evidence is reddish or bluish discoloration of the scrotum with enlargement and tenseness of the testis. It is not possible to transil-luminate the mass. Systemic manifestations are rare in infants. Beyond infancy the boy may complain initially of a slight discomfort in the swollen testis; later there are intense pain, exquisite tenderness, lower abdominal pain, fever, nausea and vomiting. A prior history of trauma is not uncommon. When the torsion occurs in an undescended

testis, diagnosis is more difficult. The disorder is frequently incorrectly diagnosed as epididymitis or orchitis, owing to the similarity in clinical manifestations; in these conditions, Prehn's sign is positive (i.e., elevation of the scrotum relieves the pain), whereas with torsion Prehn's sign is negative.

Treatment is immediate surgical exposure and untwisting of the torsion and fixation of the testis to the scrotal tissues. An abnormally mobile contralateral testis should be similarly fixed to scrotal tissues at the time of operation. The affected testis should be removed only when severe necrosis is apparent, since even when there is bluish black discoloration some return of function may occur. When there is doubt as to the diagnosis, it is preferable to operate rather than delay, since orchitis is rare in childhood. A 70 per cent salvage rate can be achieved when the disorder is treated within 10 hours of its onset; acute scrotal pain should always, therefore, be assessed immediately.

Torsion of one of the appendages of the testis also occurs, most often of the hydatid of Morgagni. The presenting symptom is acute onset of unilateral scrotal pain; the clinical course may be similar to that in torsion of the spermatic cord. Treatment consists in surgical removal of the necrotic appendix testis.

NEPHROLITHIASIS*(Renal Calculus)*

Although renal calculi are less common in children than in adults, they often signal an important underlying disorder for which it may be possible to institute specific therapy. The basic physicochemical events leading to calculus formation are poorly understood, regardless of the underlying disorder.

Nephrolithiasis occurs about twice as frequently in boys as in girls. Renal calculi are more common in some of the developing countries of southeast Asia than in North America. As the standard of living rises, the incidence of calculi appears to decline. The principal causes of nephrolithiasis in children in order of frequency are: (1) urinary infection, notably those associated with stasis; (2) idiopathic; (3) hypercalciuria; (4) cystinuria; and (5) hyperoxaluria (oxalosis).

Cystinuria and oxalosis are uncommon causes of nephrolithiasis in children. They are discussed elsewhere.

Most stones consist principally of calcium oxalate or calcium phosphate, or a mixture of them. Magnesium ammonium calcium phosphate stones occur principally in patients with infections, usually with a urea-splitting organism, especially of the *Proteus* genus. In this situation urinary concentration of ammonia rises as urea is split and the urine becomes alkaline. This favors the precipitation of calculi.

Calculi in *idiopathic nephrolithiasis* usually consist of calcium oxalate; there is no evidence of excessive excretion of any urinary crystalloid. A genetic predisposition to the formation of calcium oxalate stones has been recognized apart from that in patients with hyperoxaluria and hypercalciuria. This condition is probably of polygenic origin and the female appears to be at lesser risk than the male.

It has been suggested that idiopathic hypercalciuria is the result of a primary renal defect in the handling of calcium. Increased intestinal absorption of calcium and secondary hyperparathyroidism have also been observed in some patients. Hypercalciuria occurs in uncontrolled distal renal tubular acidosis, in hypercortisonism or with corticosteroid administration, in hypercalcemia due to a variety of causes and during immobilization for major fractures.

The signs and symptoms of renal calculi include colicky abdominal or flank pain, hematuria, repeated urinary infections, passing of the calculus and, uncommonly, urethral obstruction. When the underlying disorder, e.g., renal tubular acidosis or chronic renal failure owing to oxalosis is present, clinical manifestations of the basic disorder may also be observed.

Evaluation for nephrolithiasis should include: family history; an examination of the urine for red blood cells and for crystals, which may provide a clue to the diagnosis; urine culture; simultaneous determination of urine pH and serum bicarbonate concentration to exclude renal tubular acidosis; determination of blood levels of calcium, phosphorus, alkaline phosphatase and uric acid; chromatographic examination of urine for amino acids; nitroprusside test for cystine; 24-hour urine determination of calcium and oxalic acid excretion; roentgenogram of the abdomen for stones; and chemical analysis of any stones which are passed.

TREATMENT. A high fluid intake should be assured throughout the 24-hour period in order to reduce the concentration of precipitable crystalloids. If there is acute renal colic, an analgesic should be given. Surgical intervention is infrequently warranted, and, given time, the calculus will either pass or be dissolved. Urinary infection, when present, should be treated with appropriate antibacterial drugs.Specific measures include correction of majoranatomic obstructive lesions; urine acidification with vitamin C, 500 mg q 6 h, and continuous prophylactic antibacterial therapy when calculi are known to be the result of recurrent urinary infection; reduction of calcium intake and administration of hydrochlorothiazide in idiopathic hyper-calciuria (oral cellulose phosphate, 5 gm two or three times daily, is effective in adults with this disorder); specific treatment of recognizable causes of hypercalciuria such as renal tubular acidosis; and alkalinization of the urine in patients with cystinuria (penicillamine may also be used). There is no specific therapy for oxalosis.

5. Additional materials for the self-control

Test. Entry level

1. The patient was administered to the hospital with acute pain in the left half of the chest and shortness of breath. He fell down from a height of 2.5 meters one day ago. On the chest X-Ray a fracture of VI, VII, VIII ribs is seen and a horizontal level of fluid reaching up to 4th rib. Established diagnosis - hemopneumothorax. What should be done?

A. Puncture of the pleural cavity in the second intercostal space along the left mid-clavicular line
B. Puncture of the pleural cavity in the seventh intercostal space along the posterior axillary line
C. Puncture and drainage of the pleural cavity in the second intercostal space along the left mid-clavicular line
D. Puncture and drainage of the pleural cavity in the fifth intercostal space along the middle left axillaris line
E. Puncture and drainage of the pleural cavity in the seventh intercostal space along the posterior left axillaris line

2. An 8-year-old child was administered to the hospital 1 hour after the abdominal trauma. Abdomen is enlarged in volume. Tympanitis is heard on percussion of the abdomen and hepatic dullness is absent. Spread pain throughout the abdominal wall, expressed tension of the muscles of the anterior abdominal wall. What is the most likely diagnosis?

A. Damage to the hollow organ, peritonitis
B. Subcapsular hematoma of the liver
C. Rupture of the pancreas, peritonitis
D. Damage to the liver, intra-abdominal bleeding
E. Spinal cord injury

3. 3. The 16-year-old patient was administered to the department of a polytrauma in a traumatic shock. Associated thoracic and abdominal injury. Breathing is superficial, arterial pressure - 80/60. Heart rate - 115 BPM, breath rate - 42 per min. Suggest an urgent measure to correct respiratory distress.

A. Introduction of narcotic analgesics B.
Conducting of mechanical ventilation
C. Immediate operation with blood reinfusion
D. Auxiliary ventilation
E. Introduction of central analgesics

4. A 4-year-old girl was administered to the surgical department with a closed abdominal trauma. The spleen damage was diagnosed. Splenectomy was performed. What are the consequences for a child's future?

A. Allergic reactions
B. Lack of physical development
C. Development of diabetes

D. Development of anemia
E. High probability of septic manifestations

5. A 12-year-old boy was injured in a car accident. A closed hip diaphysis fracture, contusion of the brain, multiple fractures of the ribs, hemopneumothorax and a scalp wound of the leg were observed. Which of these damages should be considered dominant?
A. Closed fragmentary fracture of the hip
diaphysis B. Multiple rib fractures and
hemopneumothorax
C. Contusion of the brain
D. Scalp wound of the leg
E. Damage is equivalent

1. Answers:
A and B. In this case, it is necessary not only puncture, but drainage of the pleural cavity.
C. This point is suitable for the puncture of the pleural cavity with the aim of aspiration of free air. The installation of drainage at this point will not provide sufficient drainage of the free liquid.
D. This point is safe for puncture and drainage of the pleural cavity, the establishment of drainage will help to evacuate as much as air and a free fluid from the pleural cavity
E. This point can be used for puncture and drainage of the pleural cavity in the presence of isolated hydrothorax
The correct answer is D

2. Answers:
A. The presence of tympanitis, the absence of liver dullness indicates free gas in the abdominal cavity that got there due to injury of the hollow organ and causes the development of peritonitis
B.C.D.E. Actually damage to the parenchymal organs has another clinical picture, although it is also possible in combination with the injury of the hollow organ. The intraoperative audit of the abdominal cavity, performed on urgent displays in connection with pneumoperitoneum, will allow the diagnosis of a final diagnosis
Correct answer: A

3. Answers:
A. The introduction of these drugs is necessary for the purpose of
anesthesia B. This trauma requires a mandatory mechanical ventilation
C. The carrying out of these measures should be carried out after the transfer of the child to the mechanical ventilation
D. These measures will be inadequate for such an injury
E. The introduction of these drugs is necessary for the purpose of
anesthesia Correct answer: B

4. Answers:
A. Not characteristic of postplenectomy
syndrome B. May have a secondary character
C. Not typical for post-placental bone syndrome
D. Not typical for post-penetrating syndrome
E. Characteristic for postplenectomy syndrome
Correct answer: E

5. Answers:
A. May condition the severity of the general condition, but it is not life-threatening
B. Life-threatening injuries, which in the first place cause the development of traumatic
shock C. May condition the severity of the general condition, but is not life-threatening

D. Insignificantly affects the severity of the general condition and is not life-threatening
E. Damage is not equivalent to affecting the general condition of the patient

Correct answer: B

Test. Exit level

1. A 12-year-old boy was operated due to the trauma of liver. 2 weeks after the operation a vomiting with impurities of blood appeared. What is the most likely source of bleeding?
A. Stomach ulcer
B. Ulcer of the 12th-digestive tract
C. Bleeding from the veins of the
esophagus D. Malory-Weis syndrome
E. Hemophilia

2. Child with a closed abdominal trauma with a suspicion of damage to the spleen and signs of bleeding. Which diagnosis tool will be the most informative?
A. EGDS
B. X-ray of the abdominal cavity
C. Ultrasound of the abdominal cavity D.
Scintigraphy of the abdominal cavity E.
Examination during medication sleep

3. A 9-year-old boy with a closed abdominal trauma. During examination the spleen trauma was diagnosed. What is an indication for conservative treatment?
A. Minor ruptures of parenchyma
B. Damage to another organ of the abdominal
cavity C. Stable hemodynamics
D. Presence of concomitant diseases
E. Relatively satisfactory condition

4. A 12-year-old boy was administered to an ambulance with complaints of abdominal pain, vomiting and dizziness. It was established that he fell from a tree height of 3 meters. During examination there is no liver dullness. What organ is possibly damaged?
A. Liver
B. Spleen
C. Liver and mesentery
D. Hollow organ
E. Pancreas

5. A 11-year-old child was administered to the hospital with a closed abdominal trauma. The boy fell from a height of 3 meters on the abdomen. At the examination there was a suspicion of damage to the organs of the abdominal cavity. The visual examination of the abdomen was performed in an upright position. Which of the following criteria indicates damage to the hollow organ?
A. High standing diaphragm
B. Strengthened intestinal
pneumatization C. No pneumatization
D. Free gas under the dome of the diaphragm
E. Intestinal dislocation in the lower abdominal cavity

6. A 7-month-old child fell from the dressing table. A closed abdominal trauma was been diagnosed. The ultrasound showed a suspicion of liver damage. Which of the following indicators will confirm the suspicion?

A. Reduced serum protein levels
B. Decrease of hemoglobin level C. High leukocytosis
D. Decrease in platelet count
E. Increased transaminases

7. A patient with a closed abdominal trauma. During an ultrasound examination hematoma was found in the area of a small omentum. What organ is damaged?
A. Stomach
B. Transverse colon
C. Duodenum
D. Pancreas
E. Spleen

8. A 12-year-old boy fell from a height of 3 meters on the abdomen. Complains of abdominal pain, vomiting. At the examination there was a suspicion of bladder rupture. Which of the signs will confirm it?
A. Acute urinary retention, parevesical
hematoma
B. Pyuria, hematuria
C. Peritoneal symptoms, dullness in flat places, oliguria
D. Renal colic
E. Breakthrough of pelvic bones, acute urinary retention

9. Which diagnosis tool is as informatively as possible in the diagnosis of acute kidney injury?
A. Reorenography
B. Cystoureterography
C. Cystoscopy
D. Excretory urography
E. Polypositional cystoscopy

10. In patient with closed abdominal trauma a ultrasound was performed. Suspicion of damage to the pancreas. Confirmation is:
A. Hematoma of the stomach
wall B. Subacute hematoma
C. Hematoma in the area of small omentum
D. Hematoma of the mesentery of the transverse
colon E. Enlarged stomach

Keys
1. Answers:
A.B.C.D. Vomiting with blood impurities is possible under these nosology's, but uncharacteristic anamnesis.
E. The emergence of vomiting with blood after 2 weeks after receiving a liver injury requiring surgical treatment is characteristic of this nosology Correct answer: E

2. Answers:
A. is indicated for bleeding from the upper digestive tract
B. is indicated in case of suspicion of damage to the hollow organ
S. is an informative screening method for estimating the source and intensity of bleeding
D. is an informative but routine method that is not logical to use in an urgent situation
E. is not an informative method for intra-abdominal bleeding

Answer: Correct answer: C

3. Answers:
A. not always accompanied by stable hemodynamics
B. is an indication for surgical treatment
C. is the main criterion for the possibility of conservative treatment
D. does not have a leading role in intra-abdominal bleeding
E. is not an objective criterion for the intensity of bleeding

Correct answer: C

4. Answers:
A, B, C, E are parenchymatous organs, for the damage which is not characteristic of the disappearance of liver dullness due to the presence of free air in the abdominal cavity.
D. The disappearance of liver dullness due to the presence of free air in the abdominal cavity is characteristic of damage to the hollow organ

Correct answer: D

5. Answers:
A. is not pathognomonic for damaging the hollow organ and is characterized by the relaxation of the diaphragm dome (trauma of the diaphragmatic nerve)
B. Not pathognomonic for damage to the hollow organ and is characteristic for paresis of the cat. C. is not pathognomonic for damaging the hollow organ and is characteristic for the violation of intestinal permeability
D. is pathognomonic for damagsng the hollow body with the release of air into a free abdominal cavity and accumulation in the most densely populated place
E. is not pathognomonic for damaging the hollow organ and is characteristic for + tissue in the upper abdominal cavity (hematoma, tumor-like formation)

Correct answer: D

6. Answers:
A, B, C, D - these changes are not specific and may be attributable to the trauma of other organs
E. is characteristic of liver injury

Correct answer: E

7. Answers:
A, B. characterized by the presence of free air in the abdominal cavity
C. is characterized by the presence of free air in the abdominal cavity and / and retroperitoneal hematoma (depending on the department of the duodenum)
D. is characteristic for damage to this body
E. characterized by the presence of free fluid (blood) in the abdominal cavity

Correct answer: D

8. Answers:
A. is mainly characteristic of extraperitoneal bladder rupture

B is mainly characterized by inflammatory diseases of the urinary system and kidneys C. is mainly characteristic of intraperitoneal rupture of the bladder
D. is mainly characteristic of chicken duck disease
E. is mainly characteristic of urethral injuries

Correct answer: C

9. Answers:
A. Used as non-invasive method for determining renal blood flow in a planned manner
B. Used to study the pathology of the ureter and bladder in a planned manner
C. Endoscopic examination of the bladder
D. X-ray contrast study of kidneys and urinary tracts, which is used both in the urgent and planned manner, including with kidney trauma
E. X-ray polypositional study of the bladder
Correct answer: D

10. Answers:
A. is characteristic for a trauma of the gastric wall
B is mainly characteristic of a kidney and duodenal injury C. is characteristic of a pancreatic injury
D. characteristic for injury of the transverse colon
E. is not typical of an injury

Correct answer: C

Situational tasks
1. 13 year old girl was hospitalized in an urgent department. At the examination after an accident after 6 hours there is cyanosis and difficulty breathing. The condition of the patient is severe, the right half of the chest lags behind in the act of breathing, intercostal intervals are enlarged to the right, with percussion box sound, absent breathing during auscultation.
1. List the methods that help to diagnose?
2. Your previous diagnosis?
3. What is emergency care?
Etalon answer:
1. X-Ray of the chest in an upright position
2. Tension right-sided pneumothorax
3. Puncture and drainage of the pleural cavity in the fifth intercostal space on the middle inguinal line to the right

2. A child of 4 years suffered a blunt injury to the chest (falling from the ladder to the asphalt). Increases suffocation, cyanosis. The left half of the chest is lagging behind in the act of breathing, with auscultation left breathing is not heeded, tone of the heart is determined in the right half of the chest. On the X-ray of the chest, the left-sided hydropneumothorax.
1. What is the previous diagnosis?
2. What kind of emergency care is needed? Etalon answer:
1. Tension right-sided pneumothorax
2. Puncture and drainage of the pleural cavity in the fifth intercostal space along the left middle axillary line

3. A 10-year-old boy was administered to the hospital 40 minutes after falling from a tree with complaints of pain in the left thigh, left forearm, chest and left hypochondrium. When examined the child is restless, pale, acrocyanosis is present, edema and deformity of the left thigh and forearm, limitation of movements in the indicated limbs, abrasions on the left half of the chest and left hypochondrium, lag in the act of breathing of the left half of the chest with the expansion of intercostal spaces, respiratory rate 50 breaths per minute, pulse - 120 beats per minute, blood pressure 80/50 mm.
1. Make a diagnosis.
2. Make a survey plan.

Etalon answer:
1. Polytrauma. Closed thoracic trauma. Tensioned left-sided pneumothorax. Spleen rupture. The fracture of the forearm and the left thigh. Traumatic shock II degree.
2. X-ray of the thoracic and abdominal cavity in the upright position, X-ray of the left leg and thigh in 2 projections, ultrasound examination of the abdominal cavity, general blood and urine analysis, determination of blood group and Rh factor, biochemical blood test (transaminases, bilirubin, protein, glucose, alpha-amylase, lipase, creatinine, urea, electrolytes), acid-alkaline state monitoring, and, if necessary, CT

4. A hospitalized 6-year-old child after an accident with a diagnosis: polytrauma, closed head trauma, contusion of the brain, closed thoracic trauma, left-sided pneumohemothorax, closed abdominal trauma, splenic rupture (wit with traumatic destruction of up to 25% of parenchyma), intraabdominal bleeding, traumatic shock II degree
1. What injuries are the dominant ones?
2. What is the surgical tactic?
Etalon answer:
1. Closed thoracic trauma, left-sided pneumohemothorax, closed abdominal trauma, splenic rupture, intraabdominal bleeding.
2. Puncture and drainage of the left pleural cavity in the 5th intercostal space on the left middle axillary line, stabilization of hemodynamics on the background of complex intensive therapy using hemostatics, somatostatin, antibiotics with clinical and laboratory and sonographic examination of the abdominal cavity in dynamics. With the progression of intraventricular hemorrhage, unstable hemodynamics - surgical treatment.

5. In the 6-year-old victim delivered 4 hours after the accident the diagnosis was established: polytrauma, closed head trauma, contusion of the brain, open thoracic trauma, penetrating wound of the abdominal cavity, anterior abdominal wall wound, eventration. After preoperative preparation for 2 hours surgical treatment was started. At the operation: damage to the sigmoid colon, up to 4 cm in length, with the transition to the transitional fold of the peritoneum and its separation from mesenterium within 3 cm with the presence of a significant amount of fecal contents in the abdominal cavity was noted.
1. What is the volume of surgical treatment?
2. What further surgical
tactics? Etalon answer:
1. Sanation of the abdominal cavity, resection of the damaged section of the sigmoid colon, colostomy above the level of bowel damage, sewing of the distal part of the sigmoid colon.
2. Treatment of fecal peritonitis on the restoration of the integrity of the digestive tract in the delayed period - in 2-3 months.
Theoretical questions
1. Define the concept of polytrauma, multiple, combined and associated trauma.

Etalon answer: The term "polytrauma" is common, it includes the following types of trauma: multiple, combined and associated. Multiple trauma includes damage to two or more internal organs in one cavity. Combined trauma includes damages of internal organs in two or more cavities or damage to the internal organs and musculoskeletal system. Associated trauma includes such injuries, which are caused by various traumatic agents: mechanical, thermal and radiation.

2. What is hemothorax – the definition, classification

Etalon answer: hemothorax - accumulation of blood in the pleural cavity as a result of damage to the blood vessels of the thoracic wall (intercostal, diaphragmatic, pulmonary).

Depending on the amount of blood in the pleural cavity (according to the X-ray examination and percussion), the hemothorax is defined as small - the level of the fluid does not reach the angle of the shoulder blade, the average level of the fluid is projected to the angle of the shoulder blade, and the large - the entire pleural cavity is filled with blood. In children, the degree of hemothorax should be determined by the amount of blood contained in the pleural cavity, in relation to the weight of the child's body. With small hemothorax, the volume of blood in the pleural cavity does not exceed 0.25% of the body weight, with an average of 0.5%, and large - more than 1%.

3. What kind of heart damage do you know and what is their mechanism of occurrence? Etalon answer:

Heart damage has several types. In the case of a closed trauma - a contusion, a slaughter and a rupture with a lesion of a pericardium, a myocardium, coronary vessels and nerves, a valve apparatus and folds. The same variants of damage occur in the case of penetrating trauma - wounded by sharp objects and firearms.

There are the following mechanisms of injury: - impulse and stroke in the chest;

- compression (when heavy objects fall, between mechanisms of heavy machinery, blockages, stamping);
- a hydraulic "explosive" effect of blood in the cells of the heart, which does not change its volume; - Decelerational trauma due to sudden inhibition of heart disease on the chest (accident);
- damage by sharp objects;
- firearms wounds.

4. What method of diagnosis is of primary importance in case of suspicion and trauma of the esophagus?

Etalon answer:

In case of suspicion and injury of the esophagus, it is necessary to perform X-ray of the esophagus with the water-soluble contrast.

5. Describe the clinical course of chest injury.

Etalon answer:

1. The period of acute traumatic disorders (12-48 hours) is dominated by: pleuro-pulmonary shock, intra-pulmonary haemorrhage, pulmonary and pulmonary-pleural bleeding, acute respiratory insufficiency. Causes: shock, bleeding, displacement of mediastinum organs. Complications: hemothorax (small, medium, large), intra-pulmonary hematomas, enlarged in size, pneumothorax, hemopneumotorax (simple, tense), flotation of the mediastinum, mediastinitis and subcutaneous emphysema.
2. Early post-traumatic period (1-4 days) - prevailing syndrome of exclusion from the act of respiration of the area of the pulmonary parenchyma, acute respiratory insufficiency. Cause: pulmonary collapse, posttraumatic pneumothorax and atelectasis, hemothorax, pulmonary hemorrhage.
3. Period of early complications (late post-traumatic period) 5-14 days. Prevailing syndrome of exclusion from the act of respiration of the pulmonary parenchyma and purulent-septic cells, sometimes a syndrome of pulmonary and pulmonary-pleural bleeding.

4. Period of late complications and consequences (after 15 days) - predominant purulent-septic cells, chronic purulent broncho-pulmonary and pleural syndrome.

6. What do you know about the types of damage to the pancreas? Etalon answer:
1. Contusion and edema.
2. Subcapsular hematoma.
3. Surface rupture with damage to integrity of the capsule.
4. Deep rupture of the gland (without damaging its duct).
5. Decomposition and separation of the area of the gland

7. What distinguishes the spleen damage?
Etalon answer:
There are the following lesions of the spleen:
1. Surface rupture of capsule.
2. Subcapsular hematomas.
3. Rupture of capsule and parenchyma.
4. Breaking the spleen from the vascular leg.

8. What is hemobilia and what methods of examination is confirmed? Etalon response:
Hemobilia is defined as the following symptoms: pain, intestinal bleeding and jaundice. The diagnosis is confirmed on the basis of data of ultrasound and CT (presence of intrahepatic hematoma), celiacography (depot of contrast agent outside the arterial bed), EGDS (blood comes from the pancreatic duct).

9. What are the bladder injuries and what is the mechanism of their occurrence?
Etalon answer:
There are extra - and intraperitoneal ruptures. The first occurs, as a rule, in case of fracture of the pelvic bones, the second due to hydrotrauma (severe compression of the filled bladder).

10. What degree of kidney damage do you know?
Etalon answer: There are five degrees of damage: I-damage without signs of subcapsular or paranephral accumulation of fluid (blood, urine); II - partial damage to the kidney, a small amount of fluid in the subcapsular or paranephral space; III - kidney rupture and significant accumulation of fluid in (out of) abdominal cavity; IV - splinting of the kidney into several parts with preservation of the connection between parts and partial blood circulation; V - damage to the kidney vessels.

6. LITERATURE FOR STUDENTS

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