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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	Acquired intestinal obstruction: dynamic ileus, commissural ileus. Acquired intestinal obstruction: intussusception of bowels.
Course	V
Faculty	foreign students preparation

POLTAVA 2020

1. The topic basis: the topic “Acquired intestinal obstruction” 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 master the list of diseases which cause the acquired intestinal obstruction.
2. To recognize the basic clinical manifestation of all types of the acquired intestinal obstruction.
3. To define the main reasons of the origin of intestinal intussusception, commissural ileus, obturative and dynamic ileus.
4. To carry out differential diagnostics of the acquired intestinal obstruction based on its origin, duration of the disease. Distinguish intestinal obstruction from the different somatic and surgical diseases which cause an abdominal syndrome.
5. To interpret the auxiliary methods of research: USD, X-ray, stomach intubation, rectal examination, cleansing enema, introduction of gas-conducting tube, pneumocolonography, laboratory and biochemical analyses.
6. To show the methods stomach intubation, rectal examination, pneumocolonography, history taking, patient examination with the acquired intestinal obstruction, recognize and systematize the symptoms of desease.
7. To analyse the cause-effect relationships of the origin of the acquired intestinal obstruction for separate patients, to ground and formulate a previous clinical diagnosis.
8. To develop the algorithm of the actions of the doctor in case of intestinal intussusception, mechanical and dynamic acquired intestinal obstruction.
9. To generalize basic principles of treatment of diseases which are accompanied by the acquired intestinal obstruction and to define an indications for conservative and operative methods of treatment.

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

Names of previous disciplines	Obtained skills
1. Anatomy	Describe the structure of the abdominal organs. To assess the features of possible variants of the anatomical structure of the abdominal cavity organs.
4. Physiology.	Describe the physiology of the gastrointestinal tract. Determine the features of the digestive system in children of different age groups.
4. Faculty pediatrics.	Differential diagnosis of acquired obstruction
5. Surgical diseases, operative Surgery and topographic anatomy.	Surgery and topographic anatomy. Identification of priority research methods and indications for surgical intervention.

8.Propedeutics of childhood diseases	Examination of a child with intestinal obstruction.
10. Radiology	Interpretation of X-ray examination data.

Thereotical questions for the lesson:

1. Give the classification of the acquired intestinal obstruction at children.
2. Define the main reasons of origin of intestinal intussusception, commissural ileus, obturative and dynamic ileus.
3. Name the basic symptoms of intestinal intussusception.
4. What are the main methods of diagnostics and treatment of intestinal intussusception?
5. Peculiarities and terms of preparation for surgery at the acquired intestinal obstruction.
6. Give description of X-ray stages of the acquired intestinal obstruction.
7. Define the basic signs of viability of the jammed bowel.
8. What methods of operative interference are executed at the intestinal intussusception.?

4. Maintenance of the subject:

ACQUIRED INTESTINAL OBSTRUCTION

Paralytic ileus is an important cause of acquired intestine obstruction. It is likely to occur as a complication of acute infections, especially pneumonia and peritonitis, and of electrolyte imbalance or uremia. It is likely to present as distention, with absence of bowel sounds and minimal pain. Pneumonia is probably the most frequent cause of paralytic ileus in infants; peritonitis, the most frequent in older children.

Incarcerated inguinal hernias and intussusception are the most frequent mechanical causes of intestinal obstruction in infants. Intestinal obstruction may also result from postoperative adhesions or those produced by acute peritonitis from which recovery occurred, or by chronic peritonitis, e.g., tuberculous peritonitis. Other causes are foreign bodies in the intestine, including fecal concretions and inspissated meconium in the newborn infant, late obstruction by intraluminal contents in cystic fibrosis (pseudomeconium ileus), and by masses of roundworms; tumors of the bowel, including mesenteric cysts, may also be obstructive.

Acute intestinal obstruction is classified as follows:

With a presence or absence of mechanical obstacle on:

a) dynamical; b) mechanical;

Dynamical intestinal obstruction depending on character of changes a tone of intestinal muscles on:

a) spastic; b) paralytic;

Mechanical intestinal obstruction with a presence or absence of compression the vessels of mesentery bowel on:

a) obturation; b) strangulation; c) mixed;

Originally: a) congenital; b) evoked [acquired];

With the arcade of intestinal maintenance:

a) complete; b) partial;

With the levels of obstruction:

a) small intestinal (high, low); b) large intestinal.

In the clinic of an **acute mechanical intestinal obstruction** distinguish three periods.

First period or the initial stage: depending on the type of obstruction, proceeds from 2 to 12 hours. The dominant sign in this period, especially at strangulation obstruction, there is pain which carries cramp character, often complicated pain shock. Already at first hour from the

beginning of disease through the loss of water cellular degitratation of develops with an typical clinical picture: thirst, dryness of mucus, shells a skin, increase level of sodium in blood.

The second period, or intermediate stage, characterized haemodynamic violations. Pain becomes permanent, and abdomen is asymmetric, exaggerated. The complete delay of emptying and gases comes. An patient is disturbed by frequent vomit. The signs of dehydration grow, that clinically shows up low blood pressure, dryness of mucus shells and skin, nausea, vomit in default of thirst. This period proceeds from 12 to 24 hours.

The third period comes in more late terms. State of sick as heavy as lead, face of Hippocrates, and tongue is dry, frequent vomit with an unpleasant smell. Considerable of haemodynamic violations appear. The temperature of body is high. An abdomen is exaggerated, and peristalsis is abscent.

At the dactylar inspection of rectum it is sometimes possible to define reason of intestinal obstruction: tumour, excrement stone, extraneous body, and in the cases of intussusception is blood or blood maintenance.

At an inspection it is necessary to pay and regard to positions the patient, they accept recumbency more frequent, but loaf rarely. Mien of during an attack - full of suffering. Without of and twinge and patient is concentrated and, even something frightened. The color of person at first is normal, then partly bloodshot, more late face of pale, lines are acuteened, and patient is covered and death-damp. In an late period of obstruction, when peritonitis joins, the lines of person become emaciated, with pale with an earthy tint skin.

The temperature of body in an initial period of obstruction does not rise usually. At the heavy forms of strangulation intestinal obstruction, when the state of collapse is an shock develops, the temperature of body can go down to $35,0^0$C, and when peritonitis develops - rises to $37,5^0$C - $38,5^0$C. Pulse at the beginning of disease substantially changes not, but in future becomes frequent, but in 8-12 hours from the beginning of disease frequency of pulse arrives at 120 b/min. and anymore. Thus of pays attention on itself disagreement between and low temperature and frequent pulse, that in an prognostic relation is unfavorable. An tongue at the beginning of disease is moist, however already in 6-8 hours becomes dry. An unpleasant smell appears from and mouth. An abdomen is exaggerated. In dependence on what part of abdomen is exaggerated, it is possible to judge about the place of intestinal obstruction, however reliable this sign is not always .

At palpation of front abdominal wall to development of peritonitis, it is not sickly, tension of it absents, the Blyumberg-Schotkin's sign is negative. During an active peristalsis which is accompanied and twinge, there is resistance of front abdominal wall and then palpation it heavily. By palpation in an abdominal region at an indigitation it is possible to find education. At obstruction on soil of obturation of it is sometimes possible palpation tumour, excrement stone.

At the analysis of data of laboratory inspection it should be remembered that an initial period of Acute intestinal obstruction is not in the global analysis of blood of changes. On more late stages erytrocytosis, leycocytosis is characteristic, with the change of leycocyt formula “to the left”, an eosinopenia and relative lymphocytosis. Haemoglobin of relatively rises to 180-200 gr/l.

An dysproteinemia, ionic violations, takes and place at biochemical researches. The concentration of chlorides especially goes down.

At research urine pay and regard to its amount. Oliguriya of testifies to dehydration of organism, an anury is and bad prognostic sign. Presence in urine of albumen, elements of blood, cylinders are the index of degenerative necrotizing changes in kidneys.

Survey X-ray and sciagraphy of abdominal region are the basic method of diagnostics of Obstruction. The Kloyber,s cups are thus determined - which remind upside-down bowls the loop of bowels, gap-filling and liquid and gas. Except for the Kloyber,s cups it is X-ray possible to look after the exaggerated bowels which form light, here and there with the ribbed picture arcs, returned and bulge up (the Kerkring,s folds). It is important to know that survey X-ray and

it is necessary to do enemas to implementation, so as the Kloyber,s cups can be observed after an enema for patients without intestinal obstruction.

At the unclear clinical picture of disease considerable help laparoscopy can give in diagnostics. Diseases of allow to diagnose visual determination of the state of bowels, exposure of tumours, accretions and other changes, especially for the leadthrough of differential diagnostics between Acute intestinal obstruction and an Acute violation of mesenterial circulation of blood (heart attack of intestine). The loops of bowel are however exaggerated promote the risk of their damages at introduction of trocar.

At the ground of diagnosis attention applies on the form of Obstruction, its level and on present complications, above all things, peritonitis which determines medical tactic is widespread.

Important of an practical value has an leadthrough of differential diagnostics between mechanical and dynamic intestinal obstruction. The exact preoperated diagnosis is very important, as tactic these treatments of two types of intestinal obstruction different. Unlike of mechanical intestinal obstruction, at dynamic paralytic obstruction and stomach-ache carries, as an rule, permanent character from the first hour of disease. There are signs of basic disease which caused dynamic obstruction. At dynamic paralytic obstruction an abdomen is exaggerated evenly, soft, and peristalsis from the beginning is hyposthenic or absents. At spastic obstruction pain cramp, an abdomen is not exaggerated, often hollow.

An differential diagnosis must be conducted with a perforated gastric and duodenum ulcer, Acute appendicitis, Acute cholecystitis, Acute pancreatitis, peritonitis.

Tactic of treatment is determined a form and reason of Obstruction.

All of patients are with suspicion on acute intestinal obstruction, or with the set diagnosis, subject urgent hospitalization in surgical permanent establishments of II – III levels. On the before hospital stage medical measures are not conducted, after the exception of symptomatic therapy at an unstable hemodynamics.

Dynamic of obstruction is subject conservative treatment, mechanical intestinal obstruction in most cases needs operating interference. However, at first hour of disease, when differential diagnostics of dynamic and mechanical obstruction not always is possible, it is necessary to make an attempt the complex of conservative measures which can be useful both in diagnostic to medical plans.

Conservative treatment which is appointed all of patients in default of displays of peritonitis must be begun such measures:

1) decompressions of stomach and, on possibility, overhead departments of thin bowel; 2) influence is on the vegetative nervous system; 3) influence is on other organs and systems with the purpose of improvement of the general state of patient, desintoxication, normalizations of water-electrolyte exchange & other

The leadthrough of complex of conservative measures can bring success only at some forms of mechanical obstruction, mainly in the initial stage of development of disease, when changes are yet reverse (for example, at obturation of bowel on soil of helmint’s invasion, in the initial stage of adgesions obstruction without strangulation, at the early forms of intussusception of bowels, in the initial stage of torsion of sigmoid bowel and other).

With the purpose of decompression of stomach and duodenum enter and probe. Evacuation of maintenance from the overcrowded an stomach considerably improves the general state of patient. Except for it, decompression of stomach is absolutely needed before an operation. It warns aspiration complications.

Appoint of an medical unloading complex which includes: 1 ml - 0,05% solution of proserini, 1 ml - 0,2% solution of aceclidini, 40-60 ml - 10% solution sodium chloride intravenously. After it execute and lumbar Novocaine blockade by 0,25% solution of novocaini - 80-100 ml biside. An medical complex is completed an siphon enema. An interval between every manipulation must not exceed more than 15 minutes and they must be executed in the indicated sequence.

For of and siphon enema utillize water of room temperature in an amount 10-15 L. In place of hard tip utillize and thick rubber tube (rectal probe) which is entered through an rectum on depth 25-50 cm. In the process of manipulation watch, that bowel air did not enter. An siphon enemas is executed only in the presence of surgeon which watches after the rightness of its implementation, by the state of patient and estimates its results.

Appearance of emptying and pass gases after the leadthrough of the indicated measures is the sign of liquidation of intestinal obstruction only in those cases, when other signs disappear: pain, vomit, and pulse is normalized, the general state is improved.

Leadthrough of conservative treatment, directed on liquidation of intestinal obstruction, impermissible at all of types of mechanical intestinal obstruction with the signs of the expressed intoxication and dehydration of organism, at presence of "fecaloid" vomit or signs of peritonitis. Such of patient is rotin urgent operating treatment. An operation is executed also at unefficiency of conservative treatment, that in those cases, when after the conducted three times unloading complex of the phenomenon of intestinal obstruction dont allow.

Preparation before operation. The primary objective of preparation is an correction of violations of homoeostasis, caused violation of the intestinal communicating and inflammatory process in an peritoneal cavity, among which considered basic water & electrolyte disorders and endotoxicosis, which are considered as principal reasons of grave condition and unstable hemodynamics at acute intestinal obstruction, that fight against an infection. Basic indication to preparation are the expressed violations of hemodynamics (low blood pressure, instability of arteriotony), heavy intoxication (high indexes of maintenance of urea, kreatinine), presence of heavy concomitant pathology with decompensation of function vitally important organs and systems (above all things – cordio-vascular), presence of clinic of widespread peritonitis.

For an leadthrough preparations will apply the wide spectrum of facilities: infusion of blood substitutes and components of blood (plasma), introduction of antibiotics, vitamins, cardiotonics, desensibilaizd, inhibitors of proteasis & other of the choice of concrete facilities depends on the state sick. Duration of preparation makes, as and rule, 1 – 3 hours of the basic criterion of efficiency of the conducted therapy is stabilizing of haemodynamic indexes.

Operating treatment. For an anaesthetizing, as and rule, utillize general anaesthesia with the leadthrough of artificial ventilation of lights. Something of is rarer used peridural anaesthesia.

More frequent all for access utilized middle - middle laparotomy. Other incision (overhead, lower, lateral) apply for patients, where reason of Obstruction, vereification to the operation, needs the proper access.

It follows to specify that the basic tasks of operating interference at intestinal obstruction are:

1) clearing of obstruction;

2) estimation of viability the staggered area of bowel and determination of shows to resection of intestinal and decompressions of it;

3) proceeding in communicating of digestive tract;

4) sanation and draining the peritoneal cavity is at presence of peritonitis.

Measures on liquidation of obstruction depend on its reason. At presence of connections execute their dissecting (adheolisis) or liberation of organ from connections (viscerolisis).

At small intestinal obstruction it is necessary to try full to remove reason which caused it, up to the resection of bowel with imposition an interintestinal anastomosis (disconnection of connections, resection of bowel at a tumour, scission of bowel with the delete of gall-stones and oth.). It a rule does not belong to large intestinal obstruction, at treatment of which simultaneous imposition of interintestinal anastomosis can result in insolvency of guy-sutures and development of peritonitis. Only at right-side localization of tumour which stops up and colon bowel, for youths sick on the early stages of development of intestinal obstruction and right-side hemicolectomy is possible with imposition of ileotransversoanastomosis. In other cases more expedient: a) two-stage; b) three-stage operations.

Two-stage operation - on the first stage is resection of the staggered area of bowel is conducted with forming of unnatural anus by an oral loop. The second stage is proceeding in continuity of intestine by imposition of anastomosis between oral and aboral bowels.

An three-stage operation – 1th stage is an unloading unnatural anus of the oral place obturation without liquidation a reason of obstruction; the 2th stage - resection of the staggered area of bowel with imposition of interintestinal anastomosis; the 3th stage - closing the unnatural anus.

Important is decompression the extended bowel, which is instrumental in proceeding in microcirculation in the bowel wall, tone and peristalsis. Attaining this purpose is possible introduction through nose and leadthrough through all of the extended bowel, during an operation, long perforated and probe (Miller-Ebbot). Decompression intestine proceeds in and postoperative period during 3-4 days to stable renewal of peristalsis.

INTUSSUSCEPTION

Intussusception, an invagination of a portion of the intestine into a distal adjacent part, is a cause of intestinal obstruction in infants and young children from 3 to 24 months of age, but is rare both earlier and later. It is more common in males and in all infants from 3 to 11 months of age.

ETIOLOGY. In most instances intussusception develops in healthy infants without demonstrable cause. Correlations between intussusception and adenovirus infections have been equivocal. In about 5 per cent of the cases a specific lesion such as a Meckel's diverticulum, polyp, nodule of ectopic pancreas, duplication of the ileum, hypertrophied Peyer's patch, lymphoma of the bowel or intramural hemorrhage in anaphylactoid purpura serves as a lead point for the intussusception.

PATHOLOGY. Intussusceptions are most frequently ileocolic, ileo-ileocolic, and ileo-ileal in type, with the upper portion (intussusceptum) invaginating into the lower (intussuscipiens), pulling the mesentery with it. Swelling begins promptly from edema and hemorrhage secondary to venous engorgement, with resultant intestinal incarceration and obstruction. Most intussusceptions do not strangulate the bowel in the first 24 hours, but may lead subsequently to intestinal gangrene and systemic shock.

CLINICAL MANIFESTATIONS. In typical cases there is sudden onset of severe paroxysmal pain, which recurs at frequent intervals and is accompanied by straining efforts and loud outcries. Initially the infant may be comfortable and play normally between the paroxysms of pain, but if the intussusception is not reduced, he becomes progressively weaker and goes into a shock-like state, with an elevation of body temperature to as high as 41° C (106° F). The pulse becomes weak and thready, the respirations shallow and grunting, and the pain may be manifested only by moaning sounds. Vomiting occurs in most instances and is usually more frequent at the beginning. In the later phase the vomitus becomes bile-stained. Fecal matter of normal appearance may be evacuated during the first few hours of symptoms. After this time fecal excretions are small, or more often do not occur, and little or no flatus is passed. Blood generally appears in the first 12 hours, but at times not for 1 or 2 days and infrequently not at all. Stools consisting chiefly of blood and mucus are common and are termed "currant jelly stools."

Palpation of the abdomen usually reveals a sausage-shaped mass, sometimes ill defined, which may increase in size and firmness during a paroxysm of pain and is most often in the right upper portion of the abdomen. It is more readily located by bimanual rectal and abdominal palpation between paroxysms of pain. The presence of bloody mucus on the finger as it is withdrawn after rectal examination supports the diagnosis of intussusception. Abdominal distention and tenderness develop as intestinal obstruction becomes more acute. On rare occasions the advancing intestine prolapses through the anus. This can be distinguished from prolapse of the rectum by the separation between the protruding intestine and the rectal wall, which does not exist in prolapse of the rectum.

Ileo-ileal intussusception may have a less typical clinical picture, the symptoms and signs being chiefly those of small intestinal obstruction. Recurrent intussusception is rare, with an incidence of no more than 2 per cent. Chronic intussusception, in which the symptoms exist in milder form at recurrent intervals, is more likely to occur with or following acute enteritis and may arise in

older children as well.

DIAGNOSIS. In intussusception the clinical history and physical findings are usually sufficiently typical for diagnosis. Roentgenographically, abdominal scout films may show a mass-like density in the area of the intussusception. The film after a barium enema will show cupping in the head of barium as its advance is obstructed by the intussusceptum. A central linear column of barium may be visible in the compressed lumen of the intussusceptum, and a thin layer of barium may be seen trapped around the invaginating intestine (coil-spring sign), especially after evacuation. Retrogression of the intussusceptum under the pressure of the enema, and gaseous distention of the small intestine from obstruction are also useful roentgenographic signs. Ileo-ileal intussusception is usually not demonstrable by barium enema, but is suspected because of gaseous distention of the intestine above the intussusception.

Differential Diagnosis. Bloody bowel movements and abdominal cramps accompanying enterocolitis may usually be differentiated from intussusception because the pain is less severe and less regular and because the infant is recognizably ill between pains from the time of onset. Bleeding from Meckel's diverticulum is usually painless. The intestinal hemorrhage of anaphylactoid purpura is usually accompanied by joint symptoms or purpura elsewhere. It is important to keep in mind that intussusception may be a complication of any of the foregoing conditions, none of which is accompanied by a palpable abdominal mass in the absence of intussusception. Since tenesmus and a discoverable tumor are usually absent in ileo-ileal intussusception, it may be confused with ileal obstruction from other causes. This is of little clinical importance, since surgical exploration is indicated in any case.

PROGNOSIS. Untreated intussusception in infants is nearly always fatal; the chances of recovery are directly related to the duration of intussusception before reduction. The majority of infants will recover if the intussusception is reduced within the first 24 hours, but the mortality rate rises rapidly after this time, and recoveries are unusual when reduction is deferred to the third day. Spontaneous reduction during transport or preparation for operation is not uncommon.

TREATMENT. Reduction of the intussusception is an emergency procedure to be carried out immediately after diagnosis and after rapid preparation for operation with fluids and blood for shock and water and electrolyte repair. In many cases of short duration, when there are no signs of prostration, shock or peritoneal irritation, it may be possible to reduce the intussusception by hydrostatic pressure under fluoroscopic guidance and with the consultation and close proximity of a surgeon. The technique is described by Ravitch as follows:

The stomach is aspirated, intravenous administration of fluids is started, and a nonlubricated Foley bag catheter is placed in the rectum and inflated. The buttocks are compressed tightly and taped with adhesive plaster. A barium solution is then allowed to flow by gravity into the colon from a height of not more than 3 to 3½ feet above the fluoroscopic table. The abdomen is not touched during the procedure. Reduction of the intussusception is manifest by free filling of the small intestine, disappearance of the mass, passage of flatus or feces and improvement in the infant's condition. Charcoal is then administered by mouth, and its recovery in an enema 6 hours later is further evidence of intestinal patency. If there is any doubt about the completeness of the reduction, an exploratory operation is performed immediately.

Reduction by the hydrostatic technique is not effective in ileo-ileal intussusception and will resolve only the colonic component of ileo-ileocolic intussusception. With adequate surgical management, operative reduction carries a very low mortality rate in early cases, and has the advantage of more certainty of reduction and of demonstration of any lead points, some of which may be removable. The recurrence rates for operative and nonoperative methods are apparently about equal. When the intussusception is irreducible or the bowel gangrenous, the involved intestine must be resected promptly.

5. Additional materials for the self-control

A. Clinical cases

Case 1. A 10 year-old boy had too much food. Paroxysmal abdominal pain appeared after it, followed by frequent vomiting. There was no emptying, flatus hasn't passed. Two years ago there was laparotomy. The boy was pale, twirled from pain in the abdomen. The abdomen was asymmetric, distended on the left side, peristalsis of bowels is evident, and during the percussion appears tympanic sound. Symptom of Obuchovsky hospital is positive.
What diagnosis have you made?
What tactics have you developed?

Case 2. In children's department there is a 2 year-old child with bilateral pneumonia. Despite treatment, the abdomen gets distended; there appears vomiting with admixture of bile, shortness of breath grows. There was no emptying for 2 days. During the examination the abdomen is distended, soft. Peristalsis is sluggish. Your initial diagnosis, tactics of examination and treatment?

Case 3. An infant is being treated in the pediatric department for a weeping umbilicus. Despite treatment, the abdomen gets distended on 28th day of his life, the loops of intestine contour on the front abdominal wall, there is vomiting, absence of stool, and during the auscultation bowel sounds are not heard. The infant is pale, inert. What initial diagnosis have you made?

Case 4. A 3 year-old boy was hospitalized in the surgical department with complaints on the pain in the right inguinal area, vomiting, increase of temperature to 38^0C. He has been ill for about twenty-four hours. At the examination : the state is grave, the pulse is 120 beats per minute, the tongue is dry, the abdomen is distended. During the palpation the abdomen is tense and painful in the lower regions. There was no emptying and gases. In the right inguinal area there is protruding of 4x3 cm, which is densely-elastic, sharply painful, not inlayable in the abdominal cavity. What diagnosis have you made? What tactics have you developed?

Case 5. A 6-year old child started suffering sharp paroxysmal pains in the abdomen, swelling of the abdomen, vomiting with admixture of the bile. There has been no emptying for forty-eight hours. When the girl was four she was operated on with phlegmonous appendicitis. What diagnosis have you made? What tactics have you developed?

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