Results of treatment of acute destructive pancreatitis in children.

Barskaya M.A., Zavyalkin V.A., Kuzmin A.I., Varlamov A.V., Borodin R.V., Bykov D.V., Rodionov V.G., Osipov N.L., Maznova A.V., Leontiev A.V., Frolova J.V., Artiushkina A.A.

Samara State Medical University,

Samara Regional Clinical Hospital.

Summary. Pancreatic diseases are the least studied section of Pediatric Surgery. The aim of our study was to improve the results of treatment of acute pancreatitis in children through optimization diagnosis and treatment algorithm. There were 295 patients with acute pancreatitis under our supervision from 1992 to 2013. The analysis of the patients histories of these children was done, including the identification of the most common clinical changes, registration of causes of acute pancreatitis, changes in clinical and laboratory indixes. We assume that in the diagnosis of acute pancreatitis, laboratory data, ultrasound examination, CT, laparoscopy are very important along with the clinical signs. Optimization of the diagnosis and treatment of acute pancreatitis in children allows to assess the severity of the condition more accurately, to predict the course, to improve outcomes, to reduce hospitalization time.

Actuality of the problem. Pancreatic diseases are the least studied section of Pediatric Surgery. Correct diagnosis of acute pancreatitis by primary care physicians is put in only 19.6% of the patients (Цуман В.Г. с соавт 2001).

Pancreatic injury, nutritional and medical effects occupy a significant place among the etiological factors of acute pancreatitis in children. Trauma is the cause of acute pancreatitis in about 25-45% of cases (Баиров Г.А., 1997; Цуман В.Г. с соавт 2001). Pancreatic trauma is rare - 0.3% of the total damage of the abdominal organs (Баиров Г.А., 1997; Вашетко Р.В., Толстой А.Д., 2000, Барская М.А. с соавт., 2001; Гисак С.Н. с соавт., 2001).

The overall mortality of acute pancreatitis in children is 2.1%, while the mortality rate of destructive forms of the disease, it is much higher - 6,7-50%. (Костюченко А.Л., Филин В.И., 2000; Вашетко Р.В., Толстой А.Д., 2000). Currently, there is an increase of the disease rate of pancreatitis (Bruky C. et all, 2009; Gomer B. et all, 2013).

One of the real ways to improve the outcome of acute pancreatitis in children is the optimization of diagnosis and treatment.

The aim of our study was to improve the results of treatment of acute pancreatitis in children through optimization diagnosis and treatment algorithm. We have set the following objectives: to establish the most informative clinical and laboratory indicators in children with acute pancreatitis and its complications, reflecting the specific changes of homeostasis before and after treatment, and efficiency of the treatment; to optimize the diagnosis of acute pancreatitis for adequate evaluation the condition of patients, and to improve the treatment of children with acute pancreatitis.

Materials and methods. There were 295 patients with acute pancreatitis under our supervision from 1992 to 2013. The analysis of the patients histories of these children was done, including the identification of the most common clinical changes, registration of causes of acute pancreatitis, changes in clinical and laboratory indixes.

All patients diagnosed with acute pancreatitis were included in the experimental group and divided into groups: edematous pancreatitis, pancreonecrosis. The control group included healthy patients - hospitalized for elective surgery - 18 children. In addition, all groups are devided by the age: 3 to 6 years, 7 to 11 years, 12 to 15 years.

In all patients these groups received a number of laboratory and clinical tests at the time of admission and discharge (study of hemoglobin, leukocyte count, leukocytal index of intoxication, platelet count, coagulation time, urinary diastase, serum amylase, total protein, creatinine, blood glucose, heart rate, systolic and diastolic blood pressure). Ultrasound examination of the pancreas in all patients with acute pancreatitis was performed by Diagnostic Ultrasound Scanner ALOKA SSD-4000.

Computed tomography was performed in 15 patients, laparoscopy in 13 cases.

The study of indicators of albumin have been introduced into diagnosis since 1999. The studies of the effective albumin concentration were made in 72 patients at admission, at 3 and 7 days of starting treatment and at discharge. The study was conducted using a fluorescence method and reagent kits "Probe-Albumin" analyzer CLA-01 "Probe" that monitors the total concentration of albumin (TCA) in the blood, the effective concentration of albumin (ECA), Albumin-binding capacity (ABiC), (RABiC - Reserve albumin binding capacity) and counts "toxicity index" (T = TCA / ECA - 1) (Грызунов Ю.А., Добрецов Г.Е., 1994).

All the indicators are compared with those obtained in healthy patients.

Statistical study of the data was performed using the statistical package SPSS firm SPSS (USA).

Data verification for compliance with the normal distribution consisted of the following procedures: a) histograms with superimposed normal curve; b) check on conformity to normal distribution by one-sample Kolmogorov-Smirnov's test in patients in the study group and control group.

For a description of the sample set of data mean values with standard error of the mean indixes were used, for determination of statistical significance of differences between the values of indicators in the groups of data were used Wilcoxon — Mann — Whitney test and Kruskal-Wallis test with the assessment of the level of significance of these differences.

Correlation analysis was performed using the nonparametric Spearman's rank correlation coefficient, parametric Pearson correlation coefficient and the determination of the statistical signification in the strength of connection.

Results. The analysis of the disease and the treatment of 295 children with acute pancreatitis showed that this disorder more often affects children between the ages of 7 and 15 years (81.99%), acute pancreatitis occurs in boys more often (59.01%).

We've found that, despite adequate health care coverage of children, diagnosis of this disease in the prehospital in many patients has not been established. Patients arrived for treatment to a surgical department in the first 3 days of the onset of the disease (87.58%) with diagnoses of acute appendicitis, blunt abdominal trauma, acute cholecystitis, perforated stomach ulcer . In serious condition were received 14.91% patients, in a state of moderate severity - 29.19% patients, mild - 55.90% patients.

235 children (81.37%) with the edematous pancreatitis were received and treated, 62 children with pancreonecrosis. In 17 patients diagnosed fatty pancreonecrosis, in 20 -hemorrhagic, in 25 - mixed.

Identified the following causes of edematous pancreatitis - nutritional factors (24.43%), chronic digestive diseases (34.35%), closed abdominal trauma (3.82%); the cause could not be figured out in 37.40% of the children.

The causes of pancreonecrosis were - nutritional factors (30.00%), closed abdominal trauma (30.00%), penetrating abdominal trauma - 3.33%, postoperative pancreonecrosis - 3.33%; the cause could not be figured out - in 33.33% cases.

On admission 81% of patients had vomiting, 55% had vomiting repeatedly. Encircling epigastric pain was observed in 91% of patients, Mayo-Robson's sign detected in 82% of patients, Körte's sign - 60% of patients. Clinical data showed an increase in the average heart rate of patients with the edematous pancreatitis by 15.06%, with pancreonecrosis by 26,39% ($p \leq 0,05$); decrease in systolic blood pressure in pancreonecrosis by an average of 8.24%, and in the group of 12 to 15 year old children with pancreonecrosis by 16,72% ($p \leq 0,05$); and diastolic blood pressure in patients with pancreonecrosis by an average of 7.7%, and in the group of 12 to 15 year old children with pancreonecrosis by 22,29% ($p \leq 0,05$).

The blood test showed a slight increase in the level of white blood cells - in patients with the edematous form by an average of 9.07%, with pancreonecrosis by an average of 24.54%, and in the group of 12 to 15 year old

children by 44,3% ($p \leq 0, 05$). Revealed a severe increase in the leukocytal index of intoxication - the edematous form by an average of 350%, pancreonecrosis by an average of 518%, ($p \leq 0,05$), that is the severity of the patient's condition reliably reflected by these parameters. We have not received the significant changes in hemoglobin count.

Biochemical parameters showed significant ($p \leq 0,05$) increase in urinary diastase - in patients with the edematous form 44.5 times (more than 512 Ed/l), in patients with pancreonecrosis 182.6 times; serum amylase in the edematous form in 5.7 times, in pancreonecrosis 17.6 times, ($p \leq 0,05$). Marked decrease of total protein, compared to healthy children ($p \leq 0,05$) in the edematous form by 19%, in pancreonecrosis by 26.62%; in the study of patients among the experimental group ($p \leq 0,05$) by 7.62%, so we can consider, that the rate of total protein can be used not only in the diagnosis of pancreatitis, but also in the assessment of the severity of patients.

Investigating the indicators of albumin on admission noting their significant changes in comparison with healthy children and among pationts in the experimental group. Total albumin concentration on admission was significantly lower in the experimental group compared with healthy children ($p \leq 0,05$) - in patients with the edematous pancreatitis by 24.42%, with pancreonecrosis by 28.15%. The effective albumin concentration in children with the edematous pancreatitis reduced by 45.7%, in children with pancreonecrosis by 51.32% compared with healthy children ($p \leq 0,05$). Toxicity index in children with the edematous pancreatitis increases ($p \leq 0,05$) by 416.34% and with pancreonecrosis by 506.85% compared with the healthy; when compared within the experimental group toxicity index was significantly ($p \leq 0,05$) lower in pancreonecrosis by 90, 51%. Reserve albumin binding capacity was significantly ($p \leq 0,05$) reduced in the edematous form by 28.17%, in pancreonecrosis by 32.29% compared with healthy children. Thus, indicators of albumin significantly change with the presence of pancreatitis, and reflect the severity of the condition of children with acute pancreatitis on admission. In the study of the dynamics of these indicators was marked an increase in the total albumin concentration in children with acute pancreatitis (the edematous form) on day 3 by 11%, on day 7 by 17%, and at discharge almost normal values (96%); in children with pancreonecrosis on day 3 only by 8%, on day 7 by 8% more, at discharge almost normal values (95%). The effective albumin concentration in acute pancreatitis (edematous form) on day 3 increased by 20%, on day 7 by 10% more, at discharge averaged 86% of normal values; in pancreonecrosis these indicators are comparatively lower - on day 3 increased by 15%, on day 7 by 10% (77% of normal values) and at discharge are up to 87%, compared with healthy children. Toxicity index in pancreatitis increased on day 3 by 2.5 times, on day 7 and at discharge by 2 times; in pancreonecrosis on day 3 by 3 times, on day 7 almost by 2.5 times, at discharge by 2 times.

Furthermore correlation evaluation of indicators of albumin was performed using the nonparametric Spearman's rank correlation coefficient, parametric Pearson correlation coefficient. Identified strong and medium dependence to indicators that significantly reflect the level of endogenous intoxication - leukocytal index of intoxication and total blood protein. Availability of these correlations shows that albumin indicators significantly reflected the level of endogenous intoxication, showed the severity in patients condition and can be used in the diagnosis of pancreatitis and evaluation in the efficiency of treatment.

Thus, the study of the dynamics of albumin indicators - total albumin concentration, effective albumin concentration, toxicity index and reserve albumin binding capacity - showed us that they can be used in assessment of the severity in patients condition and the efficiency of the treatment. At discharge, the total albumin concentration close to those in healthy children, and other albumin indicators are still significantly changed.

An ultrasound scan of the pancreas in children with pancreatitis identified specific changes depending on the form of the disease. The pancreas visualized in 78.88% of acute pancreatitis. In all patients with edematous form ultrasound scan showed an increase of measurements of pancreas compared to age norm, and reduction of its parenchyma echogenicity, in 35.88% determined uneven pancreatic contour. In children with pancreonecrosis in all cases observed an increase of dorsoventral size of pancreas, inhomogeneous echotexture of the pancreatic parenchyma,

effusion in omental bursa, uneven pancreatic contour. In complications sonography promotes timely diagnosis - confirms the presence of enzymatic peritonitis, retroperitoneal infiltration and retroperitoneal phlegmon. That is an ultrasound examination of the pancreas is important in the diagnosis of acute pancreatitis, allowing to recognize pancreonecrosis, promoting the timely diagnosis of complications (enzymatic peritonitis, retroperitoneal phlegmon and retroperitoneal infiltration).

Computed tomography, conducted on patients with pancreonecrosis revealed a 100% increase in the size of the pancreas, inhomogeneous structure of the pancreatic parenchyma and changes of its vascular architectonics, effusion in omental bursa; allowed timely detection of peripancreatic infiltration with involvement of peripancreatic fat tissue and pancreatic pseudocysts. Thus, computed tomography of the pancreas is important in the diagnosis of acute pancreatitis, allows us to recognize pancreonecrosis, facilitate timely diagnosis of complications.

As a result of the treatment children with acute pancreatitis, we considered that a program of conservative treatment of children with acute pancreatitis must be based on its clinical stage. In the first hours and days of the disease, at a stage of pancreatic colic and pancreatic shock treatment should include pain relief, suppression of uncontrollable vomiting, reducing of enteroparesis, moreover, reduction of water and electrolyte disturbances, suppression of pancreatic secretion (Sandostatin was introduced into the treatment algorithm since 1999), destruction of pancreatic enzymes and other biologically active substances introduced to the blood, active detoxification therapy. In order to prevent secondary infection and other purulent complications adequate antibiotic therapy in the treatment of acute pancreatitis, especially pancreonecrosis, is important. The possibility of sepsis in pancreonecrosis requires immediate applying of antibiotics with maximum effect and minimal side effects.

Indications for surgery were: peritonitis, infected pancreatic necrosis, arrosive bleeding, retroperitoneal phlegmon. 62 children were operated in total. Surgical technique was midline laparotomy or laparoscopy, revision of the abdominal cavity and pancreas, cholecystostomy (on indications), the through drain of the omental bursa, abdominal drain. In 49 observations surgery performed via laparotomy, in 13 - performed by laparoscopy. Surgeries in acute pancreatitis in phase of pancreatic necrosis are conducted in order to remove necrotic tissues and sequesters, that had not separated yet, additional drain of purulent cavities, identifying new foci of purulence and sequestration and complication control (arrosive bleeding, fistulas, etc.). Adequate drain of omental bursa and abdomen is important, thorough drain of the retroperitoneal fat if necessary, reducing hypertension in biliary tract - cholecystostomy - if necessary.

After discharge from hospital the children are subjected under dispensary observation by pediatric surgeon, pediatrician and gastroenterologist. It is imperative to conduct ultrasound examination of the abdomen every 3 months, monitoring of urinary diastase and serum amylase, to conduct FEGDS on indications. All patients should be prescribed enzyme preparations not containing bile acids for 4-5 months, vitamin therapy, Essentiale courses, choleretics, phytotherapy medicines, mineral water, physiotherapy, diet excluding heavy, fried, increasing secretion of pancreatic juice, spicy, salty food, prohibit overeating. Continuity hospital, polyclinic and subsequently medical resort is an important component for reducing the possibility of the development of chronic process and for the timely identification of emerging complications, especially after necrotic forms of this disease. Data refer to the literature (Цуман В.Г. 2001).

Children with edematous pancreatitis spent in the hospital 11.31 days before 1999; patients with pancreatic necrosis - 43.17 days; after optimization of diagnosis and treatment after 1999 patients with edematous pancreatitis spent 8.52 days in hospital (average bed-day was 8.52?!); patients with pancreatic necrosis - 30.55 days. That is as a result we managed to reduce the time of hospitalization.

The mortality rate of pancreonecrosis was 4.8% (3 children). The cause of one of lethal outcomes was a polymicrobial sepsis, against the background of new-onset diabetes, total mixed pancreonecrosis, diffuse peritonitis,

retroperitoneal phlegmon, in 2 observations - colon phlegmon, sepsis. It becomes obvious that acute pancreatitis in children is complicated and severe pathology, requires considerable effort on its timely diagnosis and treatment.

Conclusions:

1. Optimization of the diagnosis and treatment of acute pancreatitis in children allows to assess the severity of the condition more accurately, to predict the course, to improve outcomes, to reduce hospitalization time;
2. Acute pancreatitis more often occurs in children between the age of 7 and 15 years, mainly in boys;
3. Predisposing factors of edematous pancreatitis are closed abdominal trauma, nutritional factors, chronic digestive diseases, chronic liver and gallbladder diseases;
4. Changes in blood counts - leukocyte count, leukocytal index of intoxication, total protein - can be considered additional criteria reliably reflecting the severity of the condition in children with acute pancreatitis;
5. In the diagnosis of acute pancreatitis, including pancreatic necrosis, laboratory data, ultrasound examination, CT, laparoscopy are very important along with the clinical signs;
6. The study of the total albumin concentration, effective albumin concentration, toxicity index reflects the severity of the patient's condition and allows to evaluate the efficacy of the treatment of acute pancreatitis and pancreonecrosis in the dynamics.

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