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ACUTE INTESTINAL INFECTIONS: CLINICAL AND AETIOLOGICAL SPECTRUM IN HOSPITALISED CHILDREN

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Abstract. *The etiological structure and peculiarities of clinical and epidemiological manifestations of acute intestinal infections in hospitalised children are studied. A retrospective study of the case histories of 2479 children hospitalised with the clinic of acute intestinal infection was carried out. All patients underwent standard laboratory examination, including clinical, biochemical, instrumental diagnostic methods, bacteriological and molecular-biological studies to verify the causative agent. The epidemiological anamnesis of all children was clarified, and the frequency of background and concomitant diseases was studied. The diagnosis of intestinal infection was verified in 925 children (38%). Bacterial intestinal infections were detected in 610 (65 % of the transcripts).*

Key words: *acute intestinal infection, viral diarrhoea, bacterial infections, concomitant intestinal infection.*

O‘TKIR ICHAK INFEKSIYALARI: GOSPITALIZATSIYA QILINGAN BOLALARDA KLINIK-ETIOLOGIK SPEKTR

Annotatsiya. *Госпитализация қилинган болаларда ўткир ичак инфекцияларининг этиологик тузилиши ва клиник-эпидемиологик намоён бўлиш хусусиятлари ўрганилди. Ўткир ичак инфекцияси клиникаси билан госпитализация қилинган 2479 нафар боланинг касаллик тарихи ретроспектив тарзда ўрганилди. Барча беморларга қўзғатувчини аниқлаш учун клиник, биохимиявий, инструментал диагностика усуллари, бактериологик ва молекуляр-биологик тадқиқотларни ўз ичига олган стандарт лаборатория текшируви ўтказилди. Барча болаларнинг эпидемиологик анамнези аниқланди, асосий ва ёндош касалликларнинг учраш даражаси ўрганилди. “Ичак инфекцияси” ташхиси 925 нафар (38 %) болаларда тасдиқланди. Бактериал ичак инфекциялари 610 нафар (таҳлил қилинган натижаларнинг 65 %и) болаларда аниқланди.*

Калит сўзлар: *Ўткир ичак инфекцияси, вирусли диарея, бактериал инфекциялар, ёндош ичак инфекцияси.*

ОСТРЫЕ КИШЕЧНЫЕ ИНФЕКЦИИ: КЛИНИКО-ЭТИОЛОГИЧЕСКИЙ СПЕКТР У ГОСПИТАЛИЗИРОВАННЫХ ДЕТЕЙ

Аннотация. *Представлены результаты исследования этиологической структуры и клинико-эпидемиологических особенностей острых кишечных инфекций у госпитализированных детей. Проведено ретроспективное исследование историй болезни*

2479 детей, госпитализированных с клиническими проявлениями острой кишечной инфекции. Все пациенты прошли комплексное лабораторное обследование, включающее клинические, биохимические и инструментальные методы диагностики, а также бактериологические и молекулярно-биологические исследования для идентификации возбудителя. Для каждого ребенка был собран эпидемиологический анамнез и изучена частота сопутствующих и фоновых заболеваний. Диагноз кишечной инфекции был подтвержден у 925 детей (38%). Бактериальные кишечные инфекции были выявлены у 610 человек (65% случаев с установленной этиологией).

Ключевые слова: *острая кишечная инфекция, вирусная диарея, бактериальные инфекции, сопутствующая кишечная инфекция.*

"Monobacterial etiology of AKI was established in 505 children (82% of bacterial infections), while 82 patients (18%) were diagnosed with mixed bacterial infection. Among the decoded cases of acute respiratory viral infection, the proportion of diarrhea of viral origin was 26% (241 patients), with a predominance of rotavirus infection (48% of all viral infections). In 560 children (22%), acute intestinal infection developed against the background of chronic somatic pathology; concomitant diseases were detected in 468 (20%) patients.

In 41% of hospitalized children, the etiology of AKI was established. Bacterial infections were diagnosed more frequently, while the etiology remained unclear in 39% of patients. In mixed intestinal infections, 14 different combinations of bacteria were identified, with more frequent associations of opportunistic microorganisms. To improve the accuracy of the diagnosis of intestinal infections, it is recommended to make more extensive use of modern diagnostic techniques.

Intestinal infections remain one of the most common groups of infectious diseases in children. The peak incidence occurs in children under 5 years of age, with more than 123 million patients requiring medical care each year, and 9 million children requiring hospitalization [1, 2].

The economic damage from intestinal infections is also significant, since acute intestinal infections (AKI) rank II-III among the causes of childhood mortality from infectious diseases second only to acute respiratory viral infections and HIV infection [3, 4]. More than 700,000 cases of diarrhoeal diseases are registered annually in the Russian Federation. OCI is characterized by polyethology: viruses, fungi, bacteria, and protozoa can be their causative agents [5]. Currently, the structure of intestinal infections is dominated by viral diarrhea; bacterial and protozoal lesions of the gastrointestinal tract are detected in 1.5-15% of cases [6, 7]. About 139 million cases of rotavirus infection are registered annually in the world [9], while in developed countries this disease affects older children more often than in developing countries [8]. In Russia, rotavirus etiology is more common among viral gastroenteritis, while gastroenteritis of norovirus etiology takes the second place [1]. The role of astro-, adeno - and other viruses in the structure of non-bacterial gastroenteritis is actively studied: antibodies to astroviruses were detected in 71-75% of cases when examining children aged 3-10 years [2, 3].In modern conditions, the role of opportunistic microorganisms in the structure of intestinal infection pathogens is increasing [4].

This is facilitated by the violation of environmental safety, frequent, sometimes irrational, use of antibacterial drugs and other medicines that reduce the body's immunity [5].

According to S. M. Alabov and M. N. Yakushenko, the frequency of combined pathologies in patients with diarrhoeal diseases is increasing [1]. The etiological causes of mixt-infections are both representatives of the same family and representatives of different families and larger taxa and kingdoms: associations of pathogenic and opportunistic microorganisms, viruses and bacteria, bacteria and fungi are detected [6]. Thus, intestinal infections retain their importance in infectology, the structure of diarrhoeal diseases undergoes changes, the study of the etiology and clinical course of gastroenteritis of infectious origin is an urgent problem at present. Aim of the study: to investigate the etiological structure, epidemiological and clinical features of acute intestinal infections in hospitalised children. Materials and Methods The study included 2379 children aged from 1 month to 4 years who were under treatment in the paediatric infectious diseases department of the Penza Regional Clinical Centre for Specialized Medical Care. All patients underwent laboratory examination, including clinical blood and urine tests, biochemical parameters, stool coprogram examination. Instrumental methods (ultrasound examination of abdominal cavity organs, radiological methods) were included in the examination when indicated. Aetiological diagnosis was made using bacteriological method (sowing on dense nutrient media) and polymerase chain reaction (PCR) to determine RNA of viruses (rota-, noro-, astro- and enteroviruses) in faeces. To exclude hospital-acquired infection, faecal sampling for examination was performed on the first two days of admission to the hospital. The diagnosis of intestinal infection caused by opportunistic flora was made when bacterial counts of more than 105 CFU/g of faeces were determined. Statistical analysis and data processing were performed using standard Statistica 7 software. Mean values (M) and standard deviations of the mean (m) were estimated.

"The diagnosis of intestinal infection was confirmed in 928 children (39%). Bacterial intestinal infections were detected in 601 (64.8% of patients with established etiology)patients.: monobacterial infections were diagnosed in 511 children (84% of bacterial infections), and 90 (16%) patients were found to have a mixed bacterial infection. Staphylococcal enterocolitis prevailed in the structure of monobacterial AKI – 170 (33.7%) cases, salmonellosis was diagnosed in 24 (4.3%) children, dysentery (Flexner and Sonne) – in 11 (2.3%) children, klebsiellosis was detected in 89 (17.4%) cases, proteus-in 74 (14.1%), enterobacter – in 70 (13.7%) patients. 74 (14.5%) children were diagnosed with diseases caused by citrobacter, Pseudomonas aeruginosa, hafnea, acinetobacter and enterococci.

In 90 cases of combined intestinal infections, 14 different combinations of bacteria were detected; the most common associations were staphylococci and klebsiella (24 children-26.7%), staphylococci with proteus (19 children — 21.1%) and staphylococci with enterobacter (14 children — 15.6%). Mixed infection of Pseudomonas aeruginosa and Staphylococcus was detected in 8 (8.9%) patients, Staphylococcus and salmonella – in 5 (5.6%), Staphylococcus and Citrobacter-in 5 (5.6%), proteus and klebsiella - in 7 (7.8%), staphylococcus and dysentery-in 2 (2.2%) patients. In 2 (2.2%) patients, the disease was caused by an association of three bacteria: Staphylococcus aureus + Flexner's dysentery + Citrobacter and Staphylococcus aureus + Sonne's dysentery + Klebsiella.

Each combination of microorganisms: klebsiella and Sonne dysentery, Salmonella and proteus, Sonne dysentery and citrobacter, Staphylococcus and acinetobacter was detected in 1 (1.1%) child.

The proportion of viral diarrhea among the diagnosed acute respiratory infections was 25.7% (239 patients).: rotavirus infection was diagnosed in 118 children (49.4% of viral infections), norovirus gastroenteritis-in 78 (32.6%), astrovirus infection — in 12 children (5%), enterovirus infection — in 3 (1.2%). Viral associations were found in 28 (11.7%) patients: rotaviruses and noroviruses — in 19 children, rotaviruses and astroviruses — in 6 people, noroviruses and astroviruses — in 2 patients. Three viruses (rota, noro, and astrovirus) were detected simultaneously in 1 child. The low level of verification of acute intestinal infections of viral etiology is explained by the fact that not all patients underwent laboratory testing by PCR. Mixed forms of acute intestinal infections involving viruses and bacteria were detected in 88 children (9.5% of the confirmed cases). In 1451 (61%) patients, the etiology of intestinal infection was not established. Epidemiological history revealed contact with diarrhoeal diseases in 700 (29.5%) children: in 474 (19.1%) with relatives, in 166 (6.9%) with sick children, including in a preschool institution, and in 60 (2.7%) patients - in-hospital infection during hospitalisation for another disease. In 609 (25.8%) children, acute intestinal infection developed against a background of chronic somatic pathology.

Thus, background pathology was more frequently registered in the groups of children with bacterial and mixed infections (28.8 and 26.1 %, respectively). Associated diseases were detected in 471 (19.8 %) children: acute tonsillitis - in 30 (1.3 %), pneumonia - in 58 (2.4 %), acute respiratory viral infection - in 224 (9.4 %), acute bronchitis - in 78 (3.3 %), stomatitis - in 19 (0.8 %), infectious mononucleosis - in 17 (0.7%), enterobiasis - in 9 (0.4%), conjunctivitis - in 12 (0.5%), sinusitis - in 4 (0.2%), acute pyelonephritis - in 20 (0.8%) patients. Associated diseases were more frequent in children with viral diarrhoea - in 58 (24.3% of viral) cases, while among patients with intestinal infections of bacterial origin - in 113 (18.8% of bacterial) patients, and in 328 children (20.1% of diarrhoea of unknown aetiology). The clinical picture of the diseases was determined by the severity of intoxication, dyspeptic, intestinal syndromes and the degree of exicosis. The study revealed the following clinical features of viral diarrhoea. The mean age of children with enteritis of viral aetiology was 21.8 ± 7.9 months; rotavirus infection affected younger children: mean age was 17.9 ± 7.0 months, norovirus and astrovirus were detected in older patients (24.0 ± 8.4 and 22.1 ± 6.9 months, respectively). The mean age of children with mixed-virus infections was 21.9 ± 8.1 months. The time of hospital stay ranged from 4 to 11 days, with an average bed-day of 7.7 ± 2.7 days. The severity of the children's condition was assessed by the severity of the intoxication syndrome and the degree of dehydration. The vast majority of children (210 children, 87.6 %) had an average degree of severity of the disease. Increase of body temperature to febrile values in the first two days of the disease was registered in 10 (8.5 %) children with rotavirus infection and in 5 (17.8 %) patients with mixed diarrhoeal viral diseases. Subfebrile fever was noted in 38 (32.2 %) patients with rotavirus enteritis, in 14 (16.1%) children with norovirus infection and in 9 (32.1 %) patients with mixt-diarrhoeal diseases.

Dehydration of various degrees was detected in all hospitalised patients with viral gastroenteritis. Excicosis of I degree was observed in 211 (88 %) patients, excicosis of II degree - in 30 (12 %) children.

"Monobacterial intestinal infections were detected in 511 children. The mean age of the patients was 18.9 ± 7.9 months. The distribution of patients by disease severity was as follows: mild was observed in 34 (6.6%) children, moderate — in 399 (78.1%), severe — in 78 (15.3%) children. Grade I-II exicosis was registered in 419 (82%) patients, grade II exicosis — in 92 (18%) children. Intestinal damage by the type of gastroenteritis was observed in 342 (66.9%) patients, enterocolitis and gastroenterocolitis — in 169 (33.1%) children.

Clinical features of combined bacterial intestinal infections were studied (n=90). The average age of hospitalized children was 21.2 ± 6.6 months. The duration of hospitalization varied from 7 to 15 days, and the average length of hospital stay was 10.3 ± 1.4 bed days. The disease was mild in 4 (4.4%) children, moderate in 68 (75.6%), and severe in 1 (20%). Various degrees of dehydration were detected in all patients: 60 (66.7%) children had I — II degree exicosis, 25 (31.1%) patients had II degree dehydration, and 2 (2.2%) children had II-III degree exicosis. In 82 (93.3%) children, the disease was accompanied by fever in the first days, in 19 (21.1%) patients, the temperature exceeded 38.7 °C.

Analysis of the nature of stool in the acute period of the disease showed that enteritis was observed in 33 (36.6%) children, enterocolitis — in 53 (56.7%), including 6 (6.7%) patients with hemocolitis. The most severe course of the disease was observed with a combination of salmonellosis and staphylococcal infection, as well as with a mixed infection caused by Shigella sonnei and Klebsiella oxytoca.

Conclusion: the etiology of acute intestinal infections was established in 39% of hospitalized children. Bacterial infections were diagnosed more often — in 601 (64.8% of decoded) patients. Among bacterial infections, monobacterial infections were diagnosed in 511 children (85%), while mixed bacterial infections were detected in 90 (15%) patients. In children with combined intestinal infections, 14 different combinations of bacteria were identified; the most common associations of staphylococci with other opportunistic microorganisms were recorded. Viral diarrhoea was diagnosed in 239 (25.7%) patients, the most common being rotavirus infection (49.4% of viral infections). Background diseases were detected in 25.4% of patients; pathology was more often registered in groups of children with bacterial and mixed infections. The low level of verification of intestinal infections, especially viral infections, requires a wider introduction into clinical practice of a modern and inexpensive method for verifying pathogens -immunochromatography.

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