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DIAGNOSIS AND TREATMENT OF INTESTINAL INTUSSUSCEPTION IN CHILDREN

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ДИАГНОСТИКА И ЛЕЧЕНИЕ ИНВАГИНАЦИИ КИШЕЧНИКА У ДЕТЕЙ

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Annotation. The aim of this study was to improve methods of diagnosis and treatment of intestinal intussusception in children. For this purpose, we analyzed the medical records of 116 children with the above pathologywho were treated in the period from 2000 to 2024 in thespecialized children's surgical clinic of SamaraState Medical University. These patients were divided into two groups: the controlgroup, including 46 patients (39.7%), underwent pneumoirrigoscopy. In the main group, 70 children (60.3%) were treated with hydroechocolonography under ultrasound control starting from 2014. The use of hydroechocolonography has shown its effectiveness, in most cases, patients managed to straighten the invaginate conservatively, attempts to straighten it were sometimes carried out up to several times, and some patients who were admitted later than a day were successfully used this method. Thus, the use of hydroechocolonography is preferable, especially in cases where there are no signs of peritonitis, it is preferable, while radiation exposure to the patient and staff is excluded.

Keywords: *Intestinal intussusception, children, diagnostics, radiography, ultrasound, hydroechocolonography, conservative treatment.*

Аннотация. Целью данного исследования было совершенствование методов диагностики и лечения инвагинации кишечника у детей. Для этого нами были проанализированы истории болезни 116 детей с указанной патологией, находившихся на лечении в период с 2000 по 2024 год в специализированной детской хирургической клинике Самарского государственного медицинского университета. Данные пациенты были разделены на две группы: контрольная группа, включающая 46 пациентов (39,7%), которым была проведена пневмоирригоскопия. В основной группе 70 детей (60,3%) с 2014 года лечились методом гидроэхоколонографии под контролем УЗИ. Применение гидроэхоколонографии показало свою эффективность, в большинстве случаев пациентам удавалось расправить инвагинат консервативным путем, попытки его расправления иногда проводились до нескольких раз, а у некоторых пациентов, поступивших позже, чем через сутки, этот метод был успешно применен. Таким образом, применение гидроэхоколонографии является предпочтительным, особенно в случаях, когда отсутствуют признаки перитонита, при этом исключается лучевая нагрузка на пациента и персонал.

Ключевые слова: *Кишечная инвагинация, дети, диагностика, рентгенография, УЗИ, гидроэхоколонография, консервативное лечение.*

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Introduction. Intestinal intussusception (IC) in children remains one of the most serious and potentially dangerous complications that require immediate intervention. This condition is characterized by internal inversion of one part of the intestine into another, which leads to

circulatory disorders, tissue necrosis and peritonitis. IC can present with a variety of clinical symptoms, including abdominal pain, vomiting, blood in the stool, and fever. Despite modern methods of diagnosis and treatment, IC in children remains a challenge for pediatric surgery. The main methods of diagnosing IR in children are ultrasound diagnostics, radiography and computed tomography. Treatment of IC can include both conservative and surgical methods. Conservative methods include attempts to manually straighten the IR with special manipulations or the use of a barriereвenema. However, in most cases, surgical intervention is required to restore normal blood circulation and prevent complications.

The aim of this study is to improve the methods of diagnosis and treatment of intestinal intussusception in children in order to increase the effectiveness of treatment and reduce complications.

Materials and methods of research. We analyzed the medical data of 228 children who were hospitalized with suspected IC in the period from 2000 to 2024 in the specialized children's surgical clinicof Samarkand State Medical University. The study included data on the history of the disease, clinical manifestations, results of laboratory and instrumental studies, treatment methods and outcomes. Among the examined children, whose age ranged from 3 months to 10 years, 116 were diagnosed with "intestinal intussusception", while 112 had this diagnosis excluded. IC mainly occurred in children aged 6 months to 1 year (65.5%) (Figure 1).

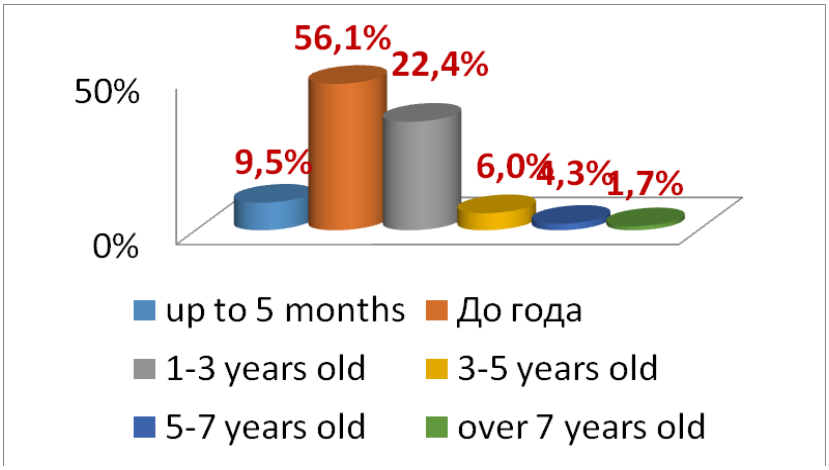

Figure 1. Distribution of subjects by age.

The majority of the patients studied were boys, accounting for 85 cases (73.3%), while the number of girls was less and accounted for 31 cases (26.7%). Among those who fell ill and lived in rural areas, 92 cases (79.3%) were identified, while urban patients were significantly less, only 24 patients (20.7%) (Table 1).

Table 1.

Distribution of patients with IC by gender and place of residence.

№	Group NO	Boys	Girls	Urban	rural
1	KG n=46	34(29,3%)	12(10,3%)	9(7,8%)	37(31,9%)
2	EXHAUST GAS n=70	51(44,0%)	19(16,4%)	15(12,9%)	55(47,4%)
Total=116		85(73,3%)	31(26,7%)	24(20,7%)	92(79,3%)

During the first 12 hours, almost a third of all children became ill, over the next 12 hours, this figure decreased slightly to a quarter, by the end of the first two days it was about a quarter, and after this period the incidence rate decreased to about a fifth of children. (Table 2)..

Table 2.

Terms of admission of patients to the hospital

Terms of hospitalization	Number of patients	%
Up to 12 hours	33	28.4%
From 12 to 24 hours	28	24.1%
From 24 hours to 48 hours	30	25.9%
From 48 hours or more	25	21.6%
Total	116	100 %

Among 116 children suffering from IC, only 9 (11.8%) were fed exclusively breast milk, 21 (27.6%) — artificial mixtures, and 46 (60.5%) — combined method. (Table 3).

Table 3

Breastfeeding	Natural	Mixed	Artificial Feeding
KG n=31(40,8%)	3(3,9%)	19(25,0%)	9(11,8%)
EXHAUST GAS n=45(59,2%)	6(7,9%)	27(35,5%)	12(15,8%)
Total 76 (100%)	9(11,8%)	46(60,5%)	21(27,6%)

In the study group of patients, the greatest number of cases of IC was observed in children whose diet was mixed. It is interesting to note that mothers mostly associated the onset of the disease with the introduction of complementary foods. In addition, IC symptoms were observed in mothers with the first child in their family in 51 out of 116 cases (44%). This fact may indicate that mothers who have the first child have less experience in caringy for the baby. (Table 4).

See Table 4.

№	Account number	KG n=46	OG n=70	Total
1	1baby	14(12,1%)	37(31,9%)	51(44%)
2	2 child	11(9,5%)	22(19,0%)	33(28.4%)
3	3 child	8(6,9%)	7(6,0%)	15(12,9%)
4	4 child	4(3,4%)	4(3,4%)	8(6.9%)
5	5 child	9(7,8%)	-9	(7.8%)
	Total	46(39,7%)	70(60,3%)	116(100%)

116 patients with IC were divided into two groups according to the method of examination and treatment. In the control groupe (CG) (treated from 2000 to 2103гг.), including 46 patients (39.7%) who underwent pneumoirrigoscopy (PIS) for diagnosis and treatment. The main group (OG), consisting of 70 children (60.3%), has also receivedи treatment with hydroechocolonographyand ultrasound since 2014 (ГЭК) .

Research results and their discussion. From the above data, it was found that the main factors contributing to the development of the disease are intestinal dysfunction (31%), the introduction of new products into the diet (27%) and nutritional errors (24%).

Features of the classic picture of IC include three main signs: paroxysmal restlessness with light intervals, the presence of blood and mucus from the anus (a symptom of "raspberry jelly") and a tumor-like formation that can be detected on palpation. The majority of children (88.8% out of 116 cases) experienced convulsive anxiety attacks with periods of temporary relief. The disease began acutely, often in children who were previously in good condition. Suddenly, the child began to experience sharp anxiety and scream. The pain syndrome appeared periodically and had the character of convulsive seizures. During painful attacks, the child became restless, cried, refused to eat, and could stamp his feet. The duration of the pain syndrome ranged from 5 to 15 minutes, with periods of temporary relief ranging from 10 to 30 minutes. (Table5).

See Table 5.

Frequency of IC symptoms in the studied patients

Symptoms	Number of patients (%)
Paroxysmal abdominal pain with light intervals	103(88.8%)
Vomiting	97 (83.6%)
Palpable formation in the abdominal cavity	87(75.0%)
Symptom of "Obukhov hospital" and "raspberry jelly	" (74.1%)
Stool and gas retention	47 (40.5%)

83.6% of children had pain syndrome, which was often accompanied by vomiting after eating for 1-2 times. Stool and gas retention was observed in 40.5% of cases. The symptom of "raspberry jelly" was manifested in 74.1% of children, especially with prolonged periods of the disease. In 75.0% of children, a palpable formation was found that has a tumor-like, soft-elastic, cylindrical shape, is moderately mobile and causes painful sensations.

Ileocecal invagination was detected in 109 (94%) of all patients in our study (Table. 6). In some of them, the invaginate was removed without much effort during surgery, and no signs of strangulation were shown, especially in cases of colon-small intestine invagination. This suggests

that conservative therapy can be initiated later than 12-24 hours after the onset of symptoms, provided that there are no peritoneal symptoms and the probability of necrosis is low.

Table 6

№	Type of intussusception	KG n=46	OG n=70	Total 116
1	Small intestinal intussusception	3(2,6%)	3(2,6%)	6(5,2%)
2	Thick-kintestinal intussusceptionintestinal intussusception	1(0,8%)	-1	(0,8%)
3	Ileocecal invagination	42 (36.2%)	67(57.8%)	109(94%)

Until 2014, the main way to diagnose IR was to perform a survey or contrast X-ray of the abdominal cavity. This method made it possible to detect the characteristic oval shadow of the invaginate head, but the patient was irradiated. However, since 2014, the main diagnostic methodhas been ultrasound examination (ultrasound). It allows you to identify classic ultrasound signs of invagination, such as the "target" and "pseudopotch"symptoms.

In Table 7, the studyя showedиthat the use of ultrasound diagnostics demonstrates high efficiency in detecting echographic signs of IR, in particular, symptoms of "target" and "pseudopotamus", with an accuracy of 100% and 97%, respectively. These results confirm the possibility of using ultrasound as an effective screening method for the diagnosis of this disease.

See Table 7.

Frequency of echo signs in IR

Echo signs of IC	Number of patients (n=70)	
	Abs.	%
"target" symptom	70	100.0
"pseudopotamus"	symptom 68	97.1

In the light of the above, ultrasound diagnostics was performed in 228 patientswho were previously diagnosed with IC. Of this group, only 116 children (50.9%) were confirmed with the diagnosis, while the remaining 112 patients (49.1%) had this diagnosis refuted.

For the diagnosis and conservative treatment of disinvagination in the CG, as PIS was used in 28 of 46 patients. Of these, 17 (37%) patients underwent PIS in the first 12 hours after the onset of the disease, while 4 patients underwent the procedure after 12 hours (from 13 to 48 hours). The effectiveness of the IPR method was successful in 21 patients, but this method was unsuccessful in 7 patients and they were later operated on. After PIS, barium suspension was passed through the gastrointestinal tract to avoid repeated IC (Table. 8).

Table 8

The term	of IPR	IPR + operation	operation	is only
12 hours	17(37,0%)	--	-	17(37,0%)
0t 13-48h	4(8,7%)	1(2,2%)	6(13,0%)	11(23,9%)
From 25-48h		3(6,5%)	3(6,5%)	6(13,0%)
After 48 hours	-	3(6,5%)	9(19,6%)	12(26,1%)
Insego	21(45,7%)	7(15,2%)	18(39,1%)	46(100%)

HEC in OG was used in 52 (44.8%) patients. At the same time, 23 patientsa out of 52 were admitted after 12 hours. The HEC method was successful in 39 (55.7%) patients, and in 13 patientswho were operated on, the attempts were unsuccessful. 15 patients had to perform up to 2-3 HEC attempts, whereas in the case of IPR, there was only one attempt due to the risk of radiation exposure. It should be noted that in the OG, the number of patients with successful conservative expansion of the IC with HES after 12 hours (the only contraindication to HES was signs of peritonitis) was in 23 (32.9%) cases, and in the CG, this figure was 4 (8.7%) patients (Table. 9).

Table 9.

Term	of HEC	HEC + operation	Operation	is only
12 hours	16(22,9%)	--	-	16(22,9%)
0t 13-48h	16(22,9%)	3(4,3%)	1(1,4%)	20(28,6%)
From 25-48h	7(10,0%)	8(11,4%)	8(11,4%)	23(32,8%)
After 48 hours	-	2(2,9%)	9(12,9%)	11(15,7%)
Insego	39(55,7%)	13(18,6%)	18(25,7%)	70(100%)

After straightening the IR with the help of HES, the passage of the gastrointestinal tract with barium suspension is practically not used, but ultrasound control is carried out in dynamics.

Conclusions. Thus, современныйmodern imaging techniques, including ultrasound diagnostics, bring significant innovations in the field of IR detection in children. Our preference is given to HES, regardless of the time since the onset of the disease, especially in cases where there are no signs of peritonitis. Further research in the development of new diagnostic methods aimed at earlier detection of intestinal intussusception in children, as well as at improving surgical approaches, can significantly increase the effectiveness of treatment and reduce the risk of complications.

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