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Comprehensive Measures to Treat and Prevent Dead-End Diseases in Children

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Abstract This article provides detailed information on current methods of clutch diagnosis in childhood. A brief description of the methods of ultrasound, and radiopaque examination is given, as well as the possibilities of using spiral computed tomography in the connective genesis of the intestine are considered. Methods of conservative and surgical treatment of the clutch are described in detail.

Keywords In children, Clutch disease, Diagnosis, Treatment

1. Relevance

Due to the constant increase in the number and volume of surgical interventions performed on the abdominal areas, the value of the concomitant process also increases [3,12]. From this point of view, we consider it expedient to take actions aimed at improving diagnostic methods, as well as to develop new methods that will help to identify concomitant intestinal capture as soon as possible [6-7]. In recent years, thanks to scientific and technological progress, a large group of new technologies for radiation diagnostics, such as ultratavush, MRI, CT, and others, has become widely used in practice. Radiological methods of examination of the gastrointestinal tract are the most frequently used research methods [5-6,13]. However, even in stationary conditions, diagnostic errors are 16-34% [1,4,9]. Ultrasound diagnosis, when identifying the accompanying intestinal tract, is a good additional method. However, the cause of obstruction with ultrasound can be established extremely rarely, so this method does not replace CT when examining patients with suspected obstruction [6,12]. Patients undergoing surgery for acute adhesion intestinal obstruction (AAIO) have a much higher risk of repeated surgery compared to laparotomy for acute intestinal obstruction of a different etiology [2,10]. Mortality from complications of adhesive disease (CD) (acute adhesive and suffocating intestinal cramps) has persisted for many years, according to researchers, at the level of 16-21% [7-8], and according to some foreign data reaches 26.5% and has no downward trend [8]. The frequency of complications occurring in early and late intestinal attacks ranges from 12 to 64% [6-7].

Conservative treatment of concomitant disease is ineffective [1], and its recurrence after surgical interventions is 32-71% [13]. The literature shows that after endoscopic interventions in the abdominal cavity, fibrous-dystrophic changes develop in the abdominal cavity, which, in turn, require repeated endoscopic or anal intervention. In addition, many acute surgical diseases complicated by abdominal infection (which are the main cause of the development of complications in the abdominal cavity) today require conventional surgical treatment [3,7-8]. Despite numerous experimental studies and clinical studies, effective methods for the prevention of comorbidities developing after surgery have not yet been developed [11,12].

The purpose of the study: to improve the results of treatment and optimize measures to prevent concomitant diseases of the abdominal organs in children.

2. Research Materials and Methods

During 2018-2023, the results of the treatment of 2681 patients with acute surgical diseases of the abdominal cavity were studied. The results of the treatment of 231 (8.6%) patients with complications of concomitant disease (CD) in the abdominal cavity after surgery were also examined and analyzed. The age of patients is from 3 months to 18 years, of which 94 are girls (40.69%) and 137 are boys (59.31%). All examined patients were divided into two groups: **Comparative group (CG)** – 97 patients (42%) (2018-2020). They used the usual treatment tactics. If conservative treatment failed, an emergency laparotomy was performed to cut and separate the compounds. **Main group (MG)** – 134 patients (58%) (2021-2023). In this group, therapeutic and preventive measures were carried out based on the algorithm and methodology developed in the clinic. Adhesiolysis is performed by the traditional (laparotomic) or videolaparoscopic method. Also, for the prevention of concomitant disease

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(CD), barrier agents were used - vobenzyme, longidase, and drugs against "Mesogel." Of the 54 patients in the main group, 33 (61.1%) underwent early programmable video laparoscopic operations.

When children with concomitant diseases (CD) were hospitalized in the surgical department, the following examinations were carried out: general examination, physical examination, gastric tube decompression, abdominal and chest X-rays, Ultrasound examination, laboratory tests of blood and urine, and monitoring of acid-base state. **This inspection program was applied to all children.**

3. Study Results and Discussion

According to the results of the study, 99 (42.9%) patients had acute, 97 (42.0%) - chronic, and 35 (15.1%) - chronically recurrent. According to the information received, relatively digital radiography to identify concomitant diseases in children, ultrasound of the abdominal cavity, gastrointestinal tract, MCT (Multimodal computed tomography), and the effectiveness of CT (Computed tomography) methods and Doppler imaging of intestinal blood vessels were also calculated (Tables 1,2). The highest rates of concomitant disease (CD) were noted in MCT and CT (83.33% and 80.00%, respectively). When diagnosing the acute intestinal tract, the MCT and CT showed the greatest accuracy (92.31% and 84.62%, respectively). Ultrasound examination of abdominal organs (65.15% and 86.00%, respectively) in the case of articular disease and acute articular intestinal obstruction. Barium passage along the gastrointestinal tract in the ratio of concomitant diseases and acute intestinal obstruction (77.78% and 81.82%, respectively). At the same time, intestinal vascular dopplerography was the most ineffective in detecting adhesion (40.00%, respectively). The main method of diagnosing these diseases is MCT, which showed 83.33% of cases.

Of the 231 patients, 99 (42.9%) required surgery and 132 (57.1%) had conservative management.

In patients with the painful form of adhesive disease, conservative treatment was aimed at relieving the pain syndrome. However, it should be noted that the disappearance of symptoms of adhesive disease during conservative therapy does not indicate complete resolution of the condition. In the main group of patients, in addition to comprehensive treatment, an antibacterial drug was selected based on the results of microbiological examination, and antibacterial therapy, as well as infusion therapy measures, were carried out. In the postoperative period, along with comprehensive treatment, anti-adhesion therapy was also administered to the pediatric patients, including Longidaza polyenzyme therapy (electrophoresis with hyaluronidase). The assessment of the effectiveness of the recommended conservative treatment increased on average from 65.38 ± 6.6% to 90 ± 3.35%. At the same time, the comparison and comparison to the main group is good, from 65.38 ±6.6% to 90 ±3.35%, satisfactory, from 34.62 ±6.6% to 10 ±3.35% (Table 3).

In the main group, 54 (54.5%) patients were surgically operated on, in the comparative group, 45 (45.5%). Comparative outcomes of videolaparoscopic adhesiolysis (VLA) and open (conventional) surgical intervention in acute adhesive intestinal obstruction are presented in Table 4.

Table 1. Efficacy of diagnosis of complex radiation diagnostic methods in detecting concomitant diseases (CD) in children (n = 132)

	Digital radiography	Barium passage through the GI tract	Abdominal organs US	MCT and CT	Vascular Dopplerography of the intestinal tract
Sensitivity	65,15%	77,78%	54,55%	80,00%	40,00%
Specification	54,55%	64,44%	65,15%	83,33%	60,00%
Accuracy	59,85%	71,11%	59,85%	81,82%	50,00%

Table 2. Diagnostic efficacy of complex radiological methods in detecting acute adhesive intestinal obstruction (AAIO) in children (n=99)

	Digital radiography	Barium passage through the GI tract	Abdominal organs US	MCT and CT	Vascular Dopplerography of the intestinal tract
Sensitivity	68,00%	81,82%	86,00%	92,31%	85,71%
Specification	63,27%	75,00%	75,51%	84,62%	85,71%
Accuracy	65,66%	78,26%	80,81%	88,46%	85,71%

Table 3. Evaluation of the efficacy of conservative treatment of concomitant intestinal tract in children in the study groups (n = 132)

Indicators	Research groups			
	Main group (MG) (n=80)		Comparative group (CG) (n=52)	
	abc	M±m,%	abs	M±m,%
Good	72	90±3,35	34	65,38±6,6
Well	8	10±3,35	18	34,62±6,6
P	χ^2= 51,200; p = 0,000		χ^2 = 4,923; p = 0,027	
P	χ^2 Pearson= 12,073; p = 0,001			

Table 4. Description of surgical procedures performed in patients of the study group, n = 99

Type of surgery	Main group (MG) (n=54)		Comparative Group (CG) (n=45)		Total (%)	
	abc	M±m,%	abc	M±m,%	abc	M±m,%
Split abdominal deals	10	18,52±5,29	28 (1)	62,22±7,23	38	38,38±4,89
Abdominal isolation and partial resection of cattle	0	0±0	3	6,67±3,72	3	3,03±1,72
Abdominal isolation and abdominal abscess opening and partial skin resection	0	0±0	1	2,22±2,2	1	1,01±1
Abdominal isolation, ileostomy closure, and ileocoloanastomosis	1	1,85±1,83	0	0±0	1	1,01±1
Isolation of compounds in the abdominal cavity and closure of the ileostoma and the imposition of ileo-ileo flight-three anastomoses	0	0±0	1	2,22±2,2	1	1,01±1
Abdominal isolation and hematoma, and partial skin resection	1	1,85±1,83	0	0±0	1	1,01±1
Abdominal isolation and superimposition of intestinal resection and ileo-ileo-triple anastamosis	3 (1)	5,56±3,12	6	13,33±5,07	9	9,09±2,89
Intestinal resection and ileoassendoanastomosis	4	7,41±3,56	3	6,67±3,72	7	7,07±2,58
Abdominal isolation, intestinal resection, and ileostomy	2	3,7±2,57	3	6,67±3,72	5	5,05±2,2
VLA	33 (1)	61,11±6,63	0	0±0	33	33,33±4,74
P	χ^2 = 104,148; p = 0,000		χ^2 = 87,067; p = 0,000		χ^2 = 173,828; p = 0,000	
P	χ^2 Pearson = 49,460; p = 0,000					

** Note () - additional simultaneous operation is performed*

Videolaparoscopic (VLA) adhesiolysis was performed in 61.1% of patients of the main group. Conversion to open laparotomy was performed in 21 patients (38.9%) due to the presence of strangulated acute adhesive intestinal obstruction (AAIO), peritonitis, and extensive intra-abdominal adhesions. In laparoscopy, the severity of the intraperiton process was assessed by the four-point scale proposed by V.V.Plechev and his co-authors (1999): 0 points - no transactions (0%); 1 point - on the territory of no more than one third of surgical scars there are visceroparetal connections (9 patients - 27.3%); 2 points - the presence of visceroparietal compounds in the region of half of the postoperative scar (14 patients - 42.4%); 3 points - 2/3 of the postoperative scar with visceroparietal connections (6 patients - 18.2%); 4 points - massive intraperitoneal fusions, leading to deformation of intestinal vesicles by postoperative scarring (4 patients - 12.1%). The introduction of minimally invasive technologies in the treatment of acute adhesive intestinal (AAIO) obstruction has allowed for a significant reduction in mortality and postoperative complications. This study demonstrated that the videolaparoscopic (VLA) adhesiolysis approach, being the most preferred surgical method for the treatment of acute adhesive intestinal obstruction (AAIO), provided the opportunity to achieve early favorable postoperative outcomes. In the main and comparative groups, the distribution of re-surgical interventions in patients with early acute adhesive intestinal obstruction was as follows (Table 5): up to 2 times – 7.1%, up to 3 times – 9.1%, up to 4 times – 4.0%.

Early postoperative complications are divided into: general surgery - 29 (29.3%) patients; somatic - 13 (13.1%) patients. The long-term outcomes of treatment were studied in 227 patients who were discharged from the hospital 1-3 years after the treatment: 205 (90.3%) patients were evaluated. Among the main group of 134 patients, 129 (96.3%) were evaluated, and among the comparative group of 93 patients, 76 (81.7%) were evaluated. 22 (9.7%) patients could not be assessed due to changes in their place of residence and contact phone numbers.

The long-term outcomes of treatment in the main and comparative groups were evaluated 1-3 years after surgery. The evaluation of the results is presented in Table 6.

The decrease in the number of complications after treatment in the main group of patients testifies to the effectiveness of the tactics of diagnosis, surgery, and rehabilitation we have developed. After rehabilitation activities on the control examination, children were gradually transferred to a diet appropriate for their age, without restrictions. Taking into account complaints about physiotherapeutic methods of influencing intestinal motility, clinical manifestations, and the results of additional examination of the child at the preoperative stage, procedures available in the outpatient network were proposed.

Table 5. Classification of reoperations in patients in the study groups (n=99)

Number of reoperations	Research groups			
	Main group (MG) (n=54)		Comparative group (CG) (n=45)	
	abs	M±m,%	abs	M±m,%
Once	48	88,89±4,28	31	68,89±6,9
twice	3	5,56±3,12	4	8,89±4,24
three times	2	3,7±2,57	7	15,56±5,4
four times	1	1,85±1,83	3	6,67±3,72
R	χ^2 = 117,704; p = 0,000		χ^2 = 47,000; p = 0,000	
R	χ^2 Pearson = 6,817; p = 0,078			

Table 6. The treatment outcomes of patients in the main and comparative groups according to the type of adhesive disease treatment (Clavien-Dindo classification, 2004) (n=205)

Research groups	Treatment outcomes	Type of treatment for adhesive diseas				
		Conservative treatment (CT)		Operative		P
		abc	M±m,%	abc	M±m,%	
MG	Good	68	90,67±3,36	45	83,33±5,07	χ^2 Pearson = 9,104; p = 0,011
	Well	7	9,33±3,36	3	5,56±3,12	
	Unsatisfactorily	0	0±0	6	11,11±4,28	
Total		75	58,14±4,34	54	41,86±4,34	
CG	Good	24	68,57±7,85	21	51,22±7,81	χ^2 Pearson = 15,292; p = 0,000
	Well	11	31,43±7,85	6	14,63±5,52	
	Unsatisfactorily	0	0±0	14	34,15±7,41	
Total		35	46,05±5,72	41	53,95±5,72	
MG+CG	Good	92	83,64±3,53	66	69,47±4,72	χ^2 Pearson = 26,322; p = 0,000
	Well	18	16,36±3,53	9	9,47±3	
	Unsatisfactorily	0	0±0	20	21,05±4,18	
Number of examined patients		110	53,66±3,48	95	46,34±3,48	
P		χ^2 = 1,098; p = 0,295				

4. Conclusions

Adhesive disease accounts for 8.6% of acute surgical pathologies of the abdominal cavity in children, developing based on anatomical and functional changes. It manifests clinically in acute (42.9%), chronic (42%), and recurrent (15.1%) forms. These different forms are of significant importance in timely diagnosis and selecting an effective treatment strategy.

According to the diagnostic algorithm developed within the study, the most informative method for diagnosing adhesive disease was Multispiral computed tomography, which provided 81.82% accuracy. It also showed high accuracy (88.46%) in diagnosing acute adhesive intestinal obstruction. Ultrasound examination of abdominal organs provided 59.85% accuracy in adhesive disease and 80.81% accuracy in acute adhesive intestinal obstruction. Barium passage analysis recorded 71.11% accuracy in adhesive disease and 78.26% accuracy in acute adhesive intestinal obstruction. Doppler ultrasound examination showed only 50% accuracy in diagnosing adhesive disease. Preventive use of “Wobenzyme”, “Longidase”, and “Mesogel”, as well as 3 annual observations using videolaparoscopic methods, showed that the quality of life in the main group improved by 8.76% (8.06% ≤ 16.82%) and relapses decreased by 20.4%.

The application of the proposed treatment and tactical approaches for adhesive disease, when compared between the main and comparative groups, increased good treatment outcomes by 27.1% (from 59.9% to 87%) and decreased unsatisfactory outcomes by 23.04% (from 34.15% to 11.11%).

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