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OPTIMIZATION OF SURGICAL TREATMENT OF ADHESIVE DISEASE IN CHILDREN

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Adhesive disease is a term used to describe conditions associated with the formation of an adhesive process in the abdominal cavity as a result of a number of reasons, the main of which is mechanical damage to the parietal and visceral peritoneum and it is characterized by varying degrees of pain and frequent adhesions.

The aim of the work – to make better the results of treatment of adhesions in children by improving existing methods of surgical treatment with antiadhesive means.

Material and methods. 73 operated children were examined for adhesive disease, late adhesive intestinal obstruction. 35 children were a comparison group (comprehensive treatment by traditional methods) and 38 children – the main group, where the proposed methods of surgical treatment were used.

Results. To improve surgical treatment and prevent recurrence of adhesions in children it is advisable to determine intraoperatively local concentrations of circular muscles of the small intestine, with partial adhesiolysis in combination with intraoperative use of sodium hyaluronate and decamethoxine.

Conclusions. Surgical treatment of adhesive disease, late adhesive intestinal obstruction in children by partial adhesiolysis with intraoperative determination of the local concentrations of circular muscles of the small intestine and release of adhesions, with the simultaneous use of sodium hyaluronate, and decamethoxine is an effective treatment for adhesive disease.

Key words:

children, adhesive disease, late adhesive intestinal obstruction, surgical treatment.

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ОПТИМІЗАЦІЯ ХІРУРГІЧНОГО ЛІКУВАННЯ СПАЙКОВОЇ ХВОРОБИ У ДІТЕЙ

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Спайкова хвороба – термін, який використовується для опису станів, пов'язаних з утворенням адгезивного процесу в черевній порожнині в результаті ряду причин, основною з яких є механічне ушкодження парієтальної та вісцеральної очеревини, і характеризується різним ступенем вираженості больового синдрому та частими виникненнями спайкової кишкової непрохідності

Мета роботи – покращити результати лікування спайкової хвороби у дітей шляхом удосконалення існуючих методів хірургічного лікування з використанням антиадгезивних засобів.

Матеріал і методи. Обстежено 73 прооперованих дітей із приводу спайкової хвороби, пізньої спайкової кишкової непрохідності. 35 дітей становили групу порівняння (комплексне лікування традиційними методами) та 38 дітей – основну групу, в якій використані запропоновані способи хірургічного лікування.

Результати. Для покращення хірургічного лікування та профілактики розвитку рецидиву спайкової хвороби у дітей доцільно інтраопераційно визначати локальну концентрацію циркулярних м'язів тонкої кишки, з частковим адгезіолізісом у поєднанні з інтраопераційним використанням розчину натрію гіалуронату та декаметоксину.

Висновки. Хірургічне лікування спайкової хвороби, пізньої спайкової кишкової непрохідності у дітей шляхом часткового адгезіолізісу з інтраопераційним визначенням локальної концентрації циркулярних м'язів тонкої кишки та звільненням від спайок, з одночасним застосуванням розчину натрію гіалуронату та декаметоксину, є ефективним способом лікування цієї патології дитячого віку.

Ключові слова:

діти, спайкова хвороба, пізня спайкова кишкова непрохідність, хірургічне лікування.

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Introduction

The incidence of adhesive disease (AD) ranges from 1,1% to 6% in children who have undergone surgery on the organs of abdominal cavity (OAC). The prevalence among other types of intestinal obstruction is 30-40%. Up to 60% of all relaparotomies in children are performed due to late adhesion intestinal obstruction (LAIO), up to 90% of them are in the first year after surgery for the underlying disease [4, 9].

According to the literature data, in the retrospective analysis, AD developed in 40,2% patients after one

surgical procedure, in 28,9% – after two operations and in 30,9% after three or more [3]; 79,4% patients were operated on the lower floors of the abdominal cavity, 20,6% – on the upper [2, 5, 7].

The issue of intraoperative use of certain barrier solution, modification of surgical interventions, use of laparoscopic technologies, suturing or not suturing of deserosated areas of the peritoneum remains unresolved [1, 8].

Thus, the development of new methods of surgical treatment of AD in children and prevention of recurrence

remains a very important issue at the current stage of the abdominal surgery development [6, 10, 11].

The aim of the study

To improve the results of adhesions treatment in children by improving existing methods of surgical treatment with antiadhesive measures.

Material and research methods

In order to solve the set tasks, 338 children with AD were examined for the period from 2000 to 2021. Conservative treatment was successful in 237 children (70,12%), 101 children (29,88%) underwent the operation. From the operated children: 28 – were admitted to the children's surgical hospital with the symptoms of AD for the first time; 73 – more than once. 21 children were previously operated on for recurrent LAIO. Of the 73 patients: 61 were operated on urgently, 12 – routinely, due to chronic abdominal pain and frequent manifestations of LAIO 4 or more times.

Selection criteria: children with AD, LAIO, who got to the surgical in-patient department more than once, and had undergone open or conservative treatment before (73 children). 61 out of them were operated in urgent procedure, 12- as elective operation in connection with chronic abdominal pain syndrome and hospitalization with LAIO effects more than 4 times.

Exception criteria – patients with early adhesive intestinal obstruction since it often develops against a background of the slow peritonitis clinical course and intestinal paralysis, and not always results in AD.

The operated children were divided into two groups. 35 children were a comparison group (comprehensive treatment by traditional methods) and 38 children – the main group, which used the proposed methods of surgical treatment.

Indications for emergency laparotomy in AD, LAIO (61 children) were: ineffectiveness of conservative therapy within 24 hours of its onset; deterioration of the patient's condition during conservative therapy for 12 hours; symptoms of peritonitis and strangulation (after 2 hours of preoperative preparation).

Indications for elective laparotomy (12 children) were as follows: hospitalization more than 4 times; chronic

abdominal pain with symptoms of colonic stasis. Written agreement to be examined and treated was obtained from all patients. All examinations were accomplished according to the European Council Convention about the rights of people and biomedicine (dated 04.04.1997), Helsinki declaration of the World medical association about ethic principles of the conduction of the scientific medical investigations with participations of persons (1964-2013), EEC Directives № 609 (dated 24.11.1986), MPH of Ukraine orders № 690 dated 23.09.2009, № 944 dated 14.12.2009, № 616 dated 03.08.2012.

Results and discussion

The highest percentage of AD in children was after operations for LAIO (52,38%), injuries of OAC (30,30%), intestinal obstruction (26,47%), destructive appendicitis with local peritonitis (26,36%) and (20,27%) spilled. The lowest percentage was recorded in children operated on for destructive appendicitis without peritonitis (11,11%).

The main clinical sign of children with AD was abdominal pain. It was diverse but predominantly spastic in 49,31%, chronic – 16,44%, acute increasing – 34,25%.

Abdominal bloating and asymmetry were pathognomonic symptoms of AD in children. The severity of bloating depended on the duration and onset of the disease. Asymmetry also depended directly on the start date. In 12 children, abdominal asymmetry and bloating were chronic symptoms and were periodically resolved with medication (cleansing and siphon enemas, antispasmodics).

In all children, as a result of the obstructive component in case of the symptoms of LAIO delayed defecation was observed. In 12 operated children, periodic occurrences of AD were noted as planned, after the removal of symptoms of intestinal obstruction, as well as delayed defecation.

Kloiber's bowls were observed in all operated children on AD during LAIO. Delayed movement of the contrast agent through the small intestine for more than 12 hours was noted in 12 children with AD during the routine examination.

The operations performed on the children of the main and comparative groups are shown in table 1.

Table 1
Distribution of children with adhesive disease according to the performed surgical interventions (n = 73).

Surgical interventions	Main group	Comparative group
Total adhesiolisys	12	13
Total adhesiolisys and resection of small intestine	6	4
Total adhesiolisys and ileostomy	1	1
Removal of the cause without total adhesiolisys	9	9
Removal of the cause without total adhesiolisys and resection of small intestine	6	3
Removal of the cause without total adhesiolisys and ileostomy	1	1
Laparoscopic elimination of the cause without total adhesiolisys	3	4
Total	38	35

Determining the location of the incision during relaparotomy was an important step in surgery. In AD, which developed after appendectomy, a midline laparotomy was performed, in the case of a previous

operation with a midline laparotomy (for example: previous median laparotomy incision for OACs injuries) – at the time of AD surgery a laparotomy incision was made with excision of the old postoperative

scar, at repeated operations (three or more), laparotomy was performed in other places. This was due to the hyperplasticity of the AP during repeated relaparotomy, the possibility of iatrogenic damage to the structures of the peritoneal cavity, involvement of OAC in the AP and parietal peritoneum in the scar tissue. Also, in patients with transrectal access (primary surgery) a median laparotomy was performed.

In 33 children (45,21%) there were intraabdominal adhesions between the structures of the abdominal cavity and the postoperative scar.

Adhesiolysis was started on the principle of «simple to complex». The loops of the small intestine were

completely freed from adhesions with an electrocoagulator in the proximal and distal directions. The condition of the intestinal wall was assessed, if necessary, resection was performed with the imposition of a small-intestinal anastomosis «end to end» or «end to side». Chyme was moved from the small intestine, from the Treiz ligament to the colon through the ileocecal valve.

Since previous studies have shown that the main cause of intraperitoneal adhesions is damage to the mesothelium, the issue of deserosation of surfaces was important. In 56,76% of cases of total adhesiolysis deserosation of the surfaces of the small intestine was marked. Surgical approach depended on the affected area (table 2).

Table 2

Surgical approach for deserosations in children operated on for adhesive disease

Surgical approach	Main group		Comparative group	
	Quantity of children	%	Quantity of children	%
Suturing of deserosation surfaces	5	45,45	5	50
Plastic peritoneal flap of mesentery	3	27,28	2	20
Plastic serous membrane	2	18,18	2	20
Resection of the deserosed area of the intestine	1	9,09	1	10
Total	11	100	10	100

When the wound surface of deserosation was up to 4,0 cm in diameter, we suggested to sew in the transverse direction with knotted sutures PDS 5/0. If the deserosation surface was more than 4,0 cm, then we suggested to use plastic of the affected area with a peritoneal flap of mesentery or its own serous membrane. With multiple deserosations of the lesion more than 10,0 cm and the inability to use one of the above three methods, resection of the small intestine was performed (2 children in our study).

The implementation of ileostomy in 4 children (5,48%) was due to peritonitis, infiltrative-inflammatory changes of the distal ileum (II) and severe condition of patients. Primary anastomosis was not justified due to the high risk of postoperative complications. Resection of the terminal department was performed at a distance of 10,0 to 40,0 cm

The distal part of the II was 3,0 to 10,0 cm long. If possible, the most area of the distal part of the II was kept as much as possible and lined to the parietal peritoneum of the lateral wall of the peritoneal cavity.

Imposition of a single-stemmed (terminal) ileostomy in the left iliac region was performed. The ileostomy was performed by forming a peritoneal-muscular-aponeurotic layer with subsequent fixation of the intestinal wall to it. From the abdominal cavity, the mesentery of the steel area of the II was fixed in the avascular space to the anterior-lateral abdominal wall to prevent evagination.

Operations to restore the continuity of the intestine began with the «stomal» stage of the operation – two envelope incisions with an electrocoagulator cut the skin, subcutaneous fat. The II was relieved of aponeurotic muscle tissue, peritoneum and mesenteric margin. A part of a sterile glove of appropriate diameter was placed on the stoma. This corresponded to the preservation of sterile conditions during the operation.

The next stage of the operation was to perform a right transrectal laparotomy. Isolation of the distal part of the

blind part of the II, even with significant development of the AP, was not difficult to do because of its fixation in the previous operation. The blind part of the II was taken on the suture holder, and the stomal section was led into the abdominal cavity. If the length of the distal part of the II from the ileocecal valve was more than 5,0 cm and the diameter 1/2 or more than proximal one, ileo-ileoanastomosis «end to end» using L-shaped serous-muscular and inverted through sutures was performed.

When the length of the distal part of the II from the ileocecal valve is less than 5,0 cm and the diameter is less than 1/2 of the proximal end, terminal ileo-ileoanastomosis «end to side» with dissection of the distal part of the II on the anti-mesenteric edge according to the diameter of the proximal II was performed. Nodal serous-muscle and inverted through sutures were applied.

23 patients underwent resection of the small intestine, in 2 cases due to a large deserosated area, in one – the presence of dense adhesive conglomerate and in 20 cases due to necrosis of the intestinal wall, in 10 of which against a background of diffuse peritonitis.

Patients of the main group underwent partial adhesiolysis using the proposed and experimentally tested method (Patent of Ukraine for invention 50150991, bull. № 20/2022. Device for determining the position of the small intestinal sphincter in abdominal surgery), the local concentration of circular muscles (LCCM) was determined intraoperatively and, in case of involment to AP, their release from adhesions was carried out using a barrier solution based on sodium hyaluronate and decamethoxine (NHD) for the treatment and prevention of recurrence of AD by the following method: the solution was poured into the abdominal cavity in the amount of 250 ml for children under 10 years and 500 ml for children over 10 years. The peritoneum was sutured with a continuous suture (Vicril 3/0, Vicril 2/0), starting from the lower corner of the wound to the middle of the wound, similarly from the upper corner of the wound.

Two nodal sutures were applied through the aponeurosis and peritoneum as holders. A catheter was inserted between the sutures to catheterize the bladder № 16 into the abdominal cavity. The upper part of the aponeurosis and the lower part to the sutures of the holders were continuously sutured. The catheter was attached to the container with NHD solution or the solution with a syringe 100 ml was injected – the suture holders were left, the catheter was moved clockwise in the abdominal

cavity, thereby introducing the solution (starting and ending in the right subhepatic space). The sutures were tied. Sutures were applied to the subcutaneous fat and skin. This administration of barrier solution allows you to follow the rules of antiseptics and prevents the solution from leaking out of the abdominal cavity.

In the observation of children from 1 to 20 years, the development of recurrence of AD was observed according to table 3.

Table 3

Distribution of children with adhesions according to the performed surgical interventions and recurrence of the disease (n = 73)

Surgical approach	Main group		Comparative group	
	Quantity of the operated children	Quantity of recurrences	Quantity of operated	Quantity of recurrences
Total adhesiolysis	12	2	13	4
Total adhesiolysis and resection of the small intestine	6	1	4	1
Total adhesiolysis and ileostomy	1	–	1	–
Removal of the cause without total adhesiolysis	9	–	9	1
Removal of the cause without total adhesiolysis and resection of small intestine	3	–	4	1
Removal of the cause without total adhesiolysis and ileostomy	6	–	3	1
Laparoscopic elimination of the cause without total adhesiolysis	1	–	1	–
Total	38	3 (7,89%)	35	8 (22,86%)

It should be noted that when using the method of partial adhesiolysis using NHD solution, no recurrence of AD was observed. In contrast, when using the same method without NHD solution, relapses occurred in 3 of 17 children.

In the main group of patients recurrent AD was resolved conservatively. In the comparison group, 4 of 8 children required relaparotomy. The operated children were treated with the method of eliminating the cause of AD without total adhesiolysis and the use of NHD solution. When children were observed for 1 to 7 years, recurrence of AD was in 1 patient that was resolved conservatively.

Total adhesiolysis led to the development of AD recurrence to a greater extent than surgery to eliminate the cause without it. The use of sodium hyaluronate in combination with decamethoxine acts on the pathogenetic links of the formation of adhesions, reducing the number of relapses.

Conclusion

Surgical treatment of adhesive disease, late adhesive intestinal obstruction in children by partial adhesiolysis with intraoperative determination of local concentrations of circular muscles of the small intestine and release of adhesions, with the simultaneous use of sodium hyaluronate solution in combination with decamethoxine treatment is effective.

Prospects for further research

Further research will be aimed at optimizing the treatment of adhesion disease by improving the therapeutic surgical tactics of such patients in order to reduce the frequency of recurrence of this disease.

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