

THE DIAGNOSTICS OF POSTOPERATIVE ABSCESSSES OF ABDOMINAL CAVITY IN CHILDREN

85 patients with abscesses of abdominal cavity (AAC) at the age from 5 to 15 years old were observed. 37 (43.5%) patients had unformed and 48 (56.5%) patients had formed intra-abdominal abscesses. Devised methods of complex investigation were used to diagnose postoperative abscesses of the abdominal cavity; they included the index of blood toxicity (IBT) and the index of spontaneous agglomeration leukocytes (ISAL) in combination with dynamic purposeful using of searching ultrasound sonography and clinical signs. The complex diagnostics including ultrasound sonography, indexes of blood toxicity, spontaneous agglomeration of leucocytes and clinical signs can allow us significantly improve the effectiveness of diagnosis of intra-abdominal abscesses in the early stages after surgical operation regarding to appendicular peritonitis (AP) in children and to choose the optimal method of surgical treatment.

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Introduction

Appendicular peritonitis (AP) is still remaining severe and dangerous disease in the children's age. In spite of the most investigations regarding to AP, mortality in its neglected forms is still high and reaches up to 10-15% (Roshal, 1996; Shamsiev et al., 2008; Pacceli et al., 1996). Besides, extensive purulent appendicular peritonitis stipulates a big amount of severe intra-abdominal complications which require repeated surgical interventions. Timely diagnostics and treatment of postoperative purulent complications, in particular the abscesses of the abdominal cavity (AAC), appears important task.

Postoperative AAC in the children's abdominal surgery belongs to the complications which are difficult to diagnose, have severe duration and outcomes. The frequency of AAC in children is still stable and holds at the level from 7.6 to 24.5% (Bojlo, 2004; Shamsiev et al., 2008). These complications are the main causes of the fatal outcomes which frequency varies from 1.5% to 13.7% (Sinenkova, 2001; Schoffel, 1993). The ACC early diagnostics could allow us to choose the most optimal method of surgical tactic of treatment. However, the diagnostic of postoperative intra-abdominal abscesses in peritonitis is a difficult problem. The difficulty is determined by the absence of pathognomic symptoms; sometimes it depends on severe condition of the patient during the first days after surgical interventions; diagnostics is hampered also by inadequate elaboration of screening-methods of ultrasound and computer diagnostics (Gadelshim et al., 2004; Barthlen et al., 1992).

The aim of the study was to elaborate the integrated complex of the most effective methods of the early diagnostic of postoperative intra-abdominal abscesses in children.

Materials and methods

85 patients with abscesses of abdominal cavity (AAC) at the age from 5 to 15 years old were observed. The patients were at the hospital treatment in the clinic of the Samarkand

department of children's surgery of the Republican specialized scientific-practical center of pediatric diseases (RSSPCP). The major part of patients was children at the school age - 68 (80%) patients. Boys were in two times more than girls, 55 (64.7%) boys against 30 (35.3%) girls. By the prescription of the inflammatory process in 37 (43.5%) patients it was noted unformed and in 48 (56.5%) patients it was noted formed intra-abdominal abscesses. Of 85 patients 68 children (80%) had solitary abscess, 17 patients (20%) had multiple abscesses (two abscesses in 12 patients, three abscesses in 3 patients and four abscesses in 2 children). Intra-abdominal abscesses were most often localized in the right iliac area in 44.5% of cases, inter-intestinal localization of abscesses was determined in 23.2% of cases, subhepatic localization of abscesses was determined in 10.6% of cases, and pelvic localization of abscesses was determined in 8.9% of patients. Rarely localization of abscesses was determined in the right subdiaphragmatic area (5.2%), in the area of the greater omentum (4.3%), in the left iliac area (1.9%) and in subdiaphragmatic (0.9%) areas.

Clinical methods of investigation: it was taking into consideration patients' complains for high temperature, stomachache and its irradiation, meteorism, diarrhea, dry mouth, signs of dysuria and weakness. Physical examination was attentive on the general appearance, body temperature, the presence of the local painfulness during the palpation of the stomach, presence of the tumor masses in the abdominal cavity, augmenting of tachycardia, tachypnea, progressive paresis of the intestines, symptoms which characterized for the different localization of the abscess of the abdominal cavity.

Ultrasound sonography (USS) was performed on the horizontal position with using special equipment ALOKA-500-SSD, SIEMENSE SONOLINE SI-450 with line sensing elements 3.5; 5.5; and 7.5 MHz; it was conducted in real time regime with use of dosing compression by the sensing element on the abdominal wall. The degree of the endogenous intoxication (EI) was measured by indexes of blood toxicity (IBT) using Garib's paramesic test (Garib et al., 2000); leukocyte index of intoxication (LII) performed by using Kalf-Kalif's method (Isakov et al., 1998) was also used. Simultaneously, the index of spontaneous agglomeration leukocytes (ISAL) and index of nuclear segmentation of leukocytes (INSL) (Shamsiev et al., 2008) were observed. Sensitivity, diagnostic precision and specificity were calculated to determine the diagnostic effectiveness of performed investigation methods (Mihailov, 2003).

Results and discussion

Devised methods of complex investigation were used to diagnose postoperative abscesses of the abdominal cavity; they included the index of blood toxicity (IBT) and the index of spontaneous agglomeration leukocytes (ISAL) in combination with dynamic purposeful using of searching ultrasound sonography and clinical signs. These methods were used several times when USS did not indicate the forming AAC in the early postoperative period, but IBT and ISAL indicate to the presence of complication.

Complex diagnostics with simultaneously using of USS, IBT, ISAL was performed in 85 patients with peritonitis. Table 1 presents the effectiveness indexes of the complex diagnostics of the unformed intra-abdominal abscesses.

TABLE 1. THE EFFECTIVENESS OF THE COMPLEX DIAGNOSTICS OF THE UNFORMED AAC

The method's conclusion in patients with postoperative AAC		The method's conclusion in patients with peritonitis without complications	
Yes	TPR - 36	Yes	FPR - 4
No	FNR - 4	No	TNR - 41
Total: 40		Total: 45	

Note: TPR - true-positive result; FPR - false-positive result; FNR - false-negative result; TNR - true-negative result

As the Table 1 shows, peritonitis complicated by abscess of the abdominal cavity (basic group) in 40 (47.1%) patients during the postoperative period; postoperative period proceeded without any intra-abdominal purulent complications in 45 (52.9%) patients (comparable group). Positive result in the diagnostics of the abscess of abdominal cavity during the complex diagnostics was achieved in 40 (47.1%) of cases with peritonitis. Intra-operational confirmation of this diagnoses was provided in 36 (42.4%) of patients. False-positive conclusions were attained in 4 (4.7%) children from 40 children: clinical investigation and observation before discharge patient from the hospital did not confirm the presence of intra-abdominal abscess.

Negative diagnostic conclusion about the abscess of abdominal cavity was made in 45 (52.9%) of cases. From this patients with excluded diagnoses of intra-abdominal abscess subsequently 4 children were operated based on data of repeated USS, clinical and laboratory investigations. In 41 cases from 45 negative conclusions the results of the complex diagnostics of AAC was true-negative. In general, diagnostic error including false-negative and false-positive conclusions was made in 8 (9.4%) children. Calculations provided the following indexes regarding to the effectiveness of the complex diagnostics of unformed intra-abdominal abscesses: method's sensitivity - 92.9%, method's specificity - 100% and diagnostic exactness - 93.1%.

The postoperative AAC diagnostics periods are shown in the Table 2.

TABLE 2. THE DIAGNOSTICS PERIODS OF POSTOPERATIVE AAC IN GROUPS OF PATIENTS

Groups	The diagnostics periods of postoperative AAC (days)				False-negative respond	In general
	3-4	5-8	9-14	More than 14		
Basic	18(45%)	17(42.5%)	5(12.5%)	-	-	40(100%)
Control	8(15.0%)	21(39.6%)	11(20.8%)	3(5.7%)	10(18.9%)	53(100%)
In general	26(27.9%)	38(40.9%)	16(17.2%)	3(3.2%)	10(10.8%)	93(100%)

From the Table 2 we can see that in basic group almost in 97.5% of cases it was succeeded to make a correct diagnosis up to 8 days of the postoperative period. This index made 54.6% in control group. Thus, the USS in combination with clinical signs (local tenderness and body temperature higher than 38 degree) and complex laboratory methods in early postoperative period allows diagnosing abscesses in the abdominal cavity at the early stages of their forming.

TABLE 3. THE AVERAGE DIAGNOSTIC PERIODS OF POSTOPERATIVE AAC

Group of patients	Peritonitis / diagnostic periods of AAC (days)		
	Local	Spreading	On average
Basic	4.9±0.4	6.8±0.3	5.9±0.2
Control	9.1±1.3	10.2±1.1	9.7±0.9
In general	7.2±0.8	8.4±0.9	7.9±0.8

TABLE 4. THE RESULTS OF COMPARATIVE ANALYSES OF THE EFFECTIVENESS OF CLINICAL, ULTRASONOGRAPHICAL AND COMPLEX DIAGNOSTICS OF THE UNFORMED AAC

Methods of investigation	Diagnostic effectiveness of the method		
	Sensitivity	Diagnostic exactness	Specificity
Clinical investigation	50.9 %	61.1 %	64.8 %
Ultrasound investigation	61.2 %	78.2 %	89.3 %
Complex diagnostics *	93.5 %	94.2 %	100 %

Note: * - Simultaneous implementation of USS, IBT, ISAL and clinical signs.

Table 3 shows diagnostic periods of postoperative AAC in the groups depending on the spreading level of peritonitis during the primary surgical operation. Thus, the suggested complex examination methods allow reliably ($p < 0.001$) earlier diagnosis of intra-abdominal abscesses in the basic group. The diagnosis period difference was 4.2 days in the local peritonitis, and 3.4 days in the spreading forms. On average, postoperative intra-abdominal abscesses were diagnosed on 5.9 ± 0.2 days in the basic group; they were indicated on 9.7 ± 0.9 days in the control group.

Table 4 provides comparison of effectiveness in using clinical, ultrasonographical and complex diagnostics during examination of unformed AAC. It appears that significant increase the diagnostic effectiveness in AAC early periods was achieved during complex investigation of patients with peritonitis in postoperative period. Therefore, the presented data clearly illustrate the effectiveness of the complex diagnostic of intra-abdominal abscesses in children.

Conclusion

Clinical diagnosis of unformed abscesses of abdominal cavity in the early stages of its development presents significant difficulties.

Complex diagnostic tools including USS, indexes of blood toxicity, spontaneous agglomeration leukocytes and clinical signs could allow us to increase significantly the diagnostic effectiveness of intra-abdominal abscesses in children in the early periods after surgical operation. Accordingly, this approach contributes to choosing the most optimal method of treatment.

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