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RESULTS OF THE APPLICATION OF ENDOSURGICAL TECHNOLOGIES IN THE DIAGNOSIS AND TREATMENT OF EARLY INTRAABDOMINAL COMPLICATIONS IN POSTOPERATIVE PERIOD

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The purpose of the study was to improve the treatment results of early intra-abdominal complications by optimizing diagnostic methods and surgical tactics. The main group consisted of 1326 patients who preferred the active use of minimally invasive technologies in choosing surgical tactics and in the treatment process. The control group included 342 patients. In this group, relaparotomy was preferred for the correction of postoperative intra-abdominal complications. Relaparotomy on demand was performed in 145 (10.9 %) patients due to the obvious impossibility of endosurgical elimination of the complication at the preoperative stage. Mortality when using minimally invasive technologies in the diagnosis and treatment of intra-abdominal complications arising after abdominal surgeries was 5.3 %, and when performing relaparotomy to correct complications - 27.8 %. The average length of stay of patients in the clinic after repeated operations using minimally invasive technologies was 14.2±5.3 days and after relaparotomy – 25.4±7.3 days. Thus, the use of the algorithm for diagnosing complications using minimally invasive technologies allows for the timely implementation of the capabilities of endosurgical and traditional technologies and thereby improves the treatment results of postoperative abdominal complications.

Key words: surgical treatment, intra-abdominal complications, abdominal operations, minimally invasive technologies, relaparotomy.

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РЕЗУЛЬТАТИ ЗАСТОСУВАННЯ ЕНДОХІРУРГІЙНИХ ТЕХНОЛОГІЙ У ДІАГНОСТИЦІ ТА ЛІКУВАННІ РАННІХ ІНТРААБДОМІНАЛЬНИХ УСКЛАДНЕНЬ У ПІСЛЯОПЕРАЦІЙНОМУ ПЕРІОДІ

Метою дослідження було покращення результатів лікування ранніх інтраабдомінальних ускладнень шляхом оптимізації методів діагностики та хірургічної тактики. Основну групу склали 1326 пацієнтів, які надавали перевагу активному використанню малоінвазивних технологій у виборі хірургічної тактики та в процесі лікування. До контрольної групи увійшли 342 пацієнти. У цій групі для корекції післяопераційних інтраабдомінальних ускладнень перевагу надавали релапаротомії. Релапаротомія на вимогу була виконана 145 (10,9 %) пацієнтам через очевидну неможливість ендохірургічного усунення ускладнення на передопераційному етапі. Летальність при використанні малоінвазивних технологій при діагностиці та лікуванні інтраабдомінальних ускладнень, що виникають після абдомінальних операцій, становила 5,3 %, а при виконанні релапаротомії для корекції ускладнень – 27,8 %. Середня тривалість перебування пацієнтів у клініці після повторних операцій із використанням малоінвазивних технологій склала 14,2±5,3 дні, а після релапаротомії – 25,4±7,3 дні. Таким чином, використання алгоритму діагностики ускладнень з використанням малоінвазивних технологій дозволяє своєчасно реалізувати можливості ендохірургічних та традиційних технологій та, тим самим, покращити результати лікування післяопераційних абдомінальних ускладнень.

Ключові слова: хірургічне лікування, інтраабдомінальні ускладнення, абдомінальні операції, малоінвазивні технології, релапаратомія.

Improving the results of diagnosis and treatment of postoperative complications is one of the most pressing issues of modern surgery [1, 4, 7]. The widespread use of minimally invasive technologies dictates the correction of the tactical algorithm [10]. The relevance of performing low-traumatic operations in patients with postoperative intraabdominal complications is due to the difficulty of detecting intraabdominal pathologies by noninvasive methods, as well as the inability to eliminate unjustified relaparotomies accompanied by high mortality [2, 3, 8]. Suffice it to say that the frequency of relaparotomies ranges from 0.5 % to 7 % [1, 2], and mortality ranges from 18.8 % to 48 %, reaching even 90 % with repeated relaparotomies and postoperative peritonitis [4, 5, 9]. The frequency of undetected complications after intraabdominal surgery is 17.8 % – 29.7 %, while in 17 % – 48 % of cases, relaparotomy is either not performed on time or is performed as a last resort [3, 4].

The purpose of the study was to improve the results of treatment of early intraabdominal complications by optimizing diagnostic methods and surgical tactics.

Materials and methods. The main group consisted of 1,326 patients treated in 2010–2023 at the M.Mirkasimov Republican Clinical Hospital and the City Clinical Hospital No. 3 in Baku, Azerbaijan. In this group, preference was given to the active use of minimally invasive technologies. The control group included 342 patients. In these patients, relaparotomy based on active and expectant tactics was preferred

to correct the complication. The characteristics of primary surgical interventions in the main and control groups are shown in Table 1.

Table 1

Characteristics of primary surgical interventions in the main and control groups

Nature of the operation	Number of patients			
	main group		control group	
	Abs.	%	Abs.	%
Operations for cholelithiasis				
– Traditional cholecystectomy	165	12.4	76	22.1
– Traditional cholecystectomy, bile duct and vater nipple surgery	124	9.3	57	16.7
– Traditional interventions on the bile ducts due to tumors, injuries, and benign structures	57	4.3	15	4.4
– Laparoscopic cholecystectomy	134	10.1	-	-
– Cholecystectomy via mini laparotomy incision	24	1.8	-	-
– ERCP, EPST	63	4.9	-	-
Total	567	42.8	148	43.2
$P_{\chi 2}$	p = 0.864			
Operations on the stomach and duodenum				
– Resection according to the Billrot-1 method	82	6.2	24	7.0
– Resection according to the Billrot-2 method	91	6.9	21	6.1
– Gastrotomy	68	5.1	17	4.9
– Gastrectomy	19	1.4	-	-
– Duodenotomy	65	4.9	21	6.1
– Gastroenteroanastomosis	53	4.0	19	5.5
– Vagotomy and pyloroplasty	145	10.9	35	10.5
– Laparoscopic vagotomy and pyloroplasty	11	0.9	-	-
Total	534	40.3	137	40.1
$P_{\chi 2}$	p = 0.943			
Other surgical interventions				
– Liver surgery	14	1.0	-	-
– Traditional appendectomy	57	4.3	27	7.9
– Laparoscopic appendectomy	8	0.6	-	-
– Hernia repair	32	2.4	12	3.5
– Operations for adhesive disease	5	0.4	2	0.6
– Open and closed abdominal injuries	43	3.2	14	4.1
– Obstetric and gynecological operations	36	2.7	-	-
– Diagnostic laparoscopy, puncture biopsy of the liver	18	1.4	-	-
– Diagnostic laparoscopy and laparotomy	5	0.4	2	0.6
– Other	7	0.5	-	-
Total	225	16.9	57	16.7
$P_{\chi 2}$	p = 0.894			
Total quantity	1326	100	342	100

The characteristics of emerging postoperative complications by subgroups of the main and control groups are shown in Table 2.

At the diagnostic stage, standard clinical, laboratory, and instrumental examination methods were used in both groups according to indications. After analyzing the obtained quantitative indices for compliance with the law of normal distribution of groups using the Shapiro-Wilk criterion, it was decided which parametric or nonparametric criteria to use for statistical calculation purposes. When the variability of quantitative indices did not meet the law of normal distribution requirements, a nonparametric criterion (Wilcoxon-Mann-Whitney) was used.

Results of the study and their discussion. On-demand relaparotomy was performed in 145 (10.9 %) patients due to the obvious impossibility of endosurgical elimination of the complication at the preoperative stage. The mortality rate was 22.1 %.

Diagnostic and therapeutic fibroesophagogastroduodenoscopy (FEGDS) was performed in 535 (40.4%) patients who had a clinical picture of intra-abdominal complications: gastrointestinal bleeding

(n=323), motor evacuation disorder (n=135), failure of anastomosis sutures without signs of widespread peritonitis (n=27), residual choledocholithiasis (n=50). We considered FEGDS as an indication for the following purposes: confirmation of the suspected complication; correction of the diagnosed complication by endoscopic method; conducting programmed dynamic monitoring. We considered the following circumstances to be contraindications for FGDS: extremely severe, terminal condition of the patient; clinical conditions in which the inexpediency of endoscopic intervention in the preoperative period becomes obvious (massive gastrointestinal bleeding, failure of anastomosis sutures, accompanied by disseminated peritonitis, excretion of intestinal contents using drains).

Table 2

Postoperative complications by group

	Type of complication	Number of patients			
		main group		control group	
		Abs.	%	Abs.	%
Patients with bleeding	Gastroduodenal bleeding	323	27.3	58	17.0
	Intra-abdominal bleeding	85	7.2	44	12.8
	Total	408	34.5	102	29.8
Patients with symptoms of gastrointestinal obstruction	Anastomosis	104	8.8	25	7.3
	Gastrostasis	31	2.6	12	3.5
	Early acute intestinal obstruction of adhesive origin	46	3.9	24	7
	Total	181	15.3	61	17.8
Patients with a clinical picture of purulent-inflammatory complications	Failure of the anastomosis	27	2.3	15	4.4
	Peritonitis	72	6.1	30	8.8
	Pancreatitis	32	2.7	29	8.5
	Abscess	34	2.9	31	9.0
	Total	165	14.0	105	30.7
Patients with biliary tract complications	Bile discharge	138	11.7	41	12.0
	Residual choledocholithiasis	50	4.2	33	9.7
	Total	188	15.9	74	21.7
Percutaneous punctures	Limited liquid formations	239	20.3	-	-
Total		1181	100	342	100

The presence of clinical signs of gastroduadenal bleeding in the postoperative period led to indications for gastroscopy in 323 patients. During endoscopic examination in 296 clinical cases, signs of continuous hemostasis with the risk of continued bleeding (n=175) or recurrence of bleeding (n=121) were revealed. Inefficacy of endoscopic hemostasis (n=12) and recurrence of arterial bleeding (n=14) were considered as indications for relaparotomy.

During the analysis of the effectiveness of endoscopic methods for stopping arterial bleeding, it was found that clipping is the most effective method. Its efficacy was 90.1 %. Argonoplasmic coagulation was effective in 80.0 % of cases, methods of joint hemostasis in 79.2 %, and electrocoagulation in 66.7 % of cases. When analyzing the recurrence rate, depending on the method of endoscopic prevention, it was also found that clipping is more effective. In general, the efficacy of endoscopic methods in preventing recurrent bleeding was 88.4 %.

We carried out endoscopic examinations of 135 patients with clinical and radiological symptoms of postoperative gastrostasis. In this category of patients, the main task of endoscopic treatment was to provide enteral nutrition. As a result, endoscopic therapeutic manipulations are permitted to avoid repeated surgical interventions. Relaparotomy was performed in only 4 patients. Only 4 patients underwent a relaparotomy.

27 patients without clinical signs of widespread peritonitis were examined with suspected failure of gastrointestinal sutures. All patients were injected with a probe for enteral nutrition from the deficit zone to the distal side, and stomach decompression was performed. Repeated surgical intervention was performed in only 4 patients due to the lack of positive endoscopic dynamics and the appearance of free fluid in the abdominal cavity. An analysis of our observations has shown that radiography and ultrasound with a contrast agent with closed defects are less informative. In such cases, an endoscopic examination is indicated for differential diagnosis, therapeutic measures or timely determination of indications for relaparotomy.

In the main group, 50 patients with residual choledocholithiasis underwent endoscopic intervention to restore bile outflow. The majority of patients (90 % of cases) underwent endoscopic

papillosphincterotomy. In all patients, control endoscopic cholangiopancreatography was performed before and after surgery. Consequently, in 96.0 % (n=48) of our observations, it was possible to restore adequate bile outflow endoscopically, of which 28 % (n=14) required repeated sanitation of hepaticocholedochus.

Thus, the use of a gastroscope permitted to exclude postoperative complications in 6.2 % (n=33) of cases, while adequate therapeutic endoscopic measures were performed in 84.3 % (n=451) of patients. The total number of relaparotomies in the study group was 9.5 % (n=51), and the mortality rate was 3.2 %.

Limited fluid formations in the abdominal cavity during ultrasound were detected in 273 observations. Both during the first ultrasound examination and during ultrasound monitoring, we took into account the following indications for performing a diagnostic puncture under ultrasound control: the presence of anoxogenic or hyperechogenic derivatives with fuzzy contours and hyperechogenic structures characteristic of air bubbles in the abdominal cavity; the presence of a solitary abscess with a diameter of more than 30 mm; intoxication syndrome, which other reasons cannot explain; the increase in the size of the fluid cavity during dynamic ultrasound. Assessing the integrity of ultrasound examination in the diagnosis of pathological fluid accumulations in the abdominal cavity, it was found that the maximum integrity parameters in the diagnosis of intraabdominal abscesses are achieved due to the presence of specific signs: 1) the sensitivity of the method is 95.6 %; 2) specificity is 98.3 %; 3) the prognostic significance of a positive result is 98.5 %; 4) the prognostic value of a negative result is 94.7 %; 5) the accuracy index is 96.5 %.

The percutaneous puncture was performed under ultrasound control in cases where the trajectory of the puncture needle and the cavity of the derivation were clearly visualized (n=239). Its efficacy was evaluated a day later during a dynamic ultrasound scan. Due to the inefficacy of percutaneous interventions in the treatment of intraabdominal abscesses (n=13), bilomas (n=7), purulent hematomas (n=2), indications for relaparoscopy were obtained in 9.2 % of cases, of which 0.8 % (n=2) relaparatomy was performed.

The efficacy of endoscopic methods (FGDS, fibrocolonoscopy, laparoscopy) in the diagnosis, treatment and determination of further tactics of abdominal complications arising after vascular interventions was also evaluated. We observed 16 patients with blood vessel thrombosis, 9 of whom underwent immediate surgery. Diagnostic laparoscopy was performed in 7 clinical cases with suspected blood vessel thrombosis. The use of laparoscopy in our observations made it possible to diagnose acute intestinal ischemia at an earlier stage. Thus, in this group of patients, diagnostic laparoscopy and relaparotomy as its continuation were performed on average 3.5 days after the first operation. However, in the control group, relarapotomy was performed on average 5.3 days after the first operation. As a result, 5 patients of the main group (n=7) were operated on again in a timely manner, and the result was satisfactory in 4 of them. Fatal outcome was registered in 7 patients in the control group (n=9).

In our opinion, laparoscopy is the only minimally invasive method that permits to diagnose and prescribe an indication for relaparotomy. In the main group, relaparoscopy was performed for postoperative bile discharge in 145 clinical cases. The control group included 41 patients with postoperative bile discharge, whose correction was not performed using minimally invasive technologies. The source of complications was found in 73.1 % of clinical cases (n=106). The sources of bile outflow were the ducts of the larynx of 19.8 % (n=21) patients, additional ducts of the square lobe of the liver in 25.5 % (n=27) patients, insufficiency of the outflow of the gallbladder in 25.5 % (n=27) patients and damage to the bile ducts in 29.2 % (n=31) patients. In 39 observations, when examining the surgical intervention area, it was impossible to detect the source of bile outflow. The conversion to a relaparotomy was performed in the following cases: the impossibility of adequate relief of bile discharge during laparoscopy (n=8), the occurrence of bile discharge after relaparoscopy and the inability to visualize the source (n=11).

Therapeutic relaparoscopy was performed in 85 patients with a clinical picture of postoperative intraabdominal bleeding. And in the control group, relaparotomy was performed in all cases (n=44). Continued bleeding was detected in 49 patients, bleeding stopped in 29, and a complication was excluded in 7 patients. According to the results of the diagnostic stage, relaparotomy was recommended in 11 cases. In 5 cases, a conversion to a relaparotomy was performed due to the inefficacy of stopping bleeding from the abscess cavity (n=1) of liver tissue (n=2), the bed of the gallbladder (n=2), directly close to the hepatic duodenum. As a result, relaparotomy was avoided in 69 out of 85 patients (81.2 %) by laparoscopy, and intraabdominal bleeding was excluded in 8.2 % (n=7) patients.

Therapeutic laparoscopy for abdominal abscesses was performed in 49 cases. Laparoscopy was performed in 69.4 % (n=34) of cases due to the inability to perform ultrasound diagnostics and puncture under its control, and in 30.6 % (n=15) of cases due to the inefficacy of puncture sanitation and percutaneous drainage. In the control group, relaparotomy for postoperative intraabdominal abscesses was performed in 31 cases. After removing the purulent contents, its cavity was sanitized with antiseptics. A detailed examination was performed and cleaned. The drainage of pus was carried out with the help of an additional counterpoint. The formation of an infiltrate involving an intestinal loop and the impossibility of its atraumatic separation was an indication for mini-laparotomy and separation finger manipulation in 4 observations.

Relaparotomy was recommended in 4 cases due to multiple interstitial intestinal abscesses. In these observations, the reason for indications for relaparotomy was the occurrence of intense bleeding in the gastroduodenal ligament area during surgery and the inability to endoscopically determine its source and restore hemostasis. Due to the use of therapeutic rehabilitation therapy in patients with postoperative intraabdominal abscesses, the efficacy was 79.5 % (n=39) of observations, and the combined use of mini-laparotomy and laparoscopy was 8.2 % (n=4) of observations. Relaparotomy was performed in 12.3 % (n=6) of clinical cases.

Rehabilitation relaparoscopy was performed in 32 patients with clinical and ultrasound signs of postoperative pancreatitis. The development of the edematous form of acute pancreatitis after biliary tract surgery was detected by laparoscopy in 9.4 % (n=3), and the development of the destructive form in 90.6 % (n=29) of observations, of which 37.5 % (n=12) had hemorrhagic pancreatic necrosis, 34.4 % (n=11) – fatty pancreatic necrosis, and 18.7 % (n=6) had a mixed form. In patients with pancreatogenic abscesses (n=8), a puncture of pus under ultrasound control was also added to laparoscopy. When the method proved ineffective, a mini-laparotomy was added in addition to laparoscopy (n=5). Consequently, laparoscopic rehabilitation was effective in 65.6 % (n=21) of the observations, in 34.4 % (n=11) of the observations indications for staged laparoscopy were revealed, in 5 of which a mini-intervention under video endoscopic control was also added to laparoscopy.

In general, when performing relaparoscopy at the diagnostic stage, suspected intraabdominal complications were excluded in 8.4 % (n=36) of cases. We determined the importance of performing a relaparotomy in 13.8 % of clinical cases (n=59), that is, when endoscopic therapeutic interventions are not considered appropriate. These clinical conditions were: suspected damage to the main bile ducts (n=15), retroduodenal perforation (n=9), intestinal perforation (n=9), peritonitis without determining the source (n=11), bleeding without determining the source (n=11), multiple intestinal loop abscesses (n=4). Indications for therapeutic relaparoscopy were determined in 77.8 % (n=334) of clinical cases. In these observations, effective therapeutic relaparoscopy was performed in 81.1 % (n=271) of cases, and relaparoscopy with the addition of mini-laparotomy was performed in 8.7 % (n=29) of cases. In 10.2 % of cases (n=34) with inadequate endosurgical interventions (unknown source of bile discharge (n=19), inability to laparoscopic stop bleeding (n=5), negative dynamics during peritonitis (n=4), bleeding from the abscess zone (n=2), intestinal perforation (n=2) and bleeding during adhesiolysis (n=2) we performed a conversion to a relaparotomy. Taking into account clinical situations in which complications were excluded at the diagnostic stage (n=36), relaparoscopy performed separately with the addition of relaparoscopy and mini-laparotomy was the last link of the tactical algorithm in 78.3 % (n=336) of cases, while indications for relaparotomy were determined in 21.7 % (n=93) observations.

We considered the indications for conversion to relaparotomy to be: inefficacy of correction of pathology by minimally invasive methods; complications arising from endoscopic manipulations and not amenable to elimination by minimally invasive methods [1, 4, 7, 8].

Thus, with the obvious inexpediency of minimally invasive interventions, we used on-demand relaparotomy in 10.9 % (n=145) and minimally invasive technologies in 89.1% of clinical situations. Minimally invasive technologies permitted to avoid unnecessary laparotomies in 5.2 % (n=69) of cases. Relaparotomy as prescribed was performed in 6.2 % (n=82) of cases, while conversion to relaparotomy was required in 4.7 % (n=62) of clinical cases. In the group of patients who underwent relaparotomy to correct complications (n=289), the mortality rate was 17.6 % (n=51), of which 22.1 % (n=32) were patients in whom the inexpediency of using minimally invasive technologies in the preoperative period was revealed. The importance of relaparotomy was discovered in the process of minimally invasive diagnosis and treatment, while the mortality rate in the patient group (n=144) was 13.2 % (n=19). The fact that these indices are significantly lower than the mortality rate after relaparotomy (31.1 %; n=95) performed in the control group with statistical reliability (Pearson -2=15.14, DF=1, p=0.0001) confirms that making a timely

and informed decision on performing relaparotomy as part of a single correction algorithm complications of abdominal surgery can improve the results of using this method.

Conclusion

The mortality rate when using minimally invasive technologies in the diagnosis and treatment of intraabdominal complications arising after abdominal surgery was 5.3 %, and when performing relaparotomy to correct complications – 27.8 %. The mean length of stay of patients in the clinic after repeated operations using minimally invasive technologies was 14.2±5.3 days, and after relaparotomy – 25.4±7.3 days.

Thus, the use of a tactical algorithm for the diagnosis and correction of complications, involving the active use of minimally invasive technologies and reasonable relaparotomy, permits to fully and timely realize the possibilities of endosurgical and traditional technologies and thereby improve the results of treatment of postoperative abdominal complications.

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