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THE CHOICE OF SURGICAL TACTICS FOR THE CORRECTION OF A HIATAL HERNIA IN PATIENTS WITH CHOLELITHIASIS COMBINED WITH GASTROESOPHAGEAL REFLUX

Reported here are the results of the examination and surgical treatment of 70 patients with cholelithiasis combined with hiatal hernia, of which 36 patients being in the main group and 34 patients in the comparison group who were hospitalized and underwent surgery in the clinic between 2020 and 2022. Based on an in-depth comparative analysis of early and long-term results of surgical treatment it has been proven to improve the efficiency of surgical treatment of patients with cholelithiasis, combined with gastroesophageal reflux disease and hiatal hernia. According to different authors, hiatal hernia is combined with cholelithiasis in 8-12% of cases. Insufficient preoperative examination of this group of patients often leads to underdiagnosis of concomitant pathology requiring surgical correction, and to failure to perform the necessary surgical treatment in such cases. Many authors indicate that up to 11% of patients with cholelithiasis after cholecystectomy during re-examination have a clinic of gastroesophageal reflux disease refractory to conservative therapy and requiring surgical treatment. In practice, the tactics are chosen in a calculation method using the original formula. Thanks to the research, it was possible to optimize the tactics of surgical treatment of patients with comorbidities.

Keywords: cholelithiasis; hiatal hernia; gastroesophageal reflux disease; combined pathology.

Introduction

According to different authors, hiatal hernia (HH) is combined with cholelithiasis (GSD) in 8-12% of cases. Insufficient preoperative examination of this group of patients often leads to underdiagnosis of concomitant pathology requiring surgical correction, and to failure to perform the necessary surgical treatment in such cases [1, 2, 3, 4].

Many authors indicate that up to 11% of patients with cholelithiasis after cholecystectomy (CE) upon re-examination have a clinic of gastroesophageal reflux disease (GERD), refractory to conservative therapy and requiring surgical treatment [5, 6, 7].

Literature data show that HH relapses after surgical treatment of cholelithiasis, combined with GERD and HH, occur from 3 to 12%, and in the group of patients with a hiatal opening larger than 6 cm² – up to 30%. One of the main causes of HH recurrence is tissue tension and dystrophic changes in the crura of the diaphragm. Suturing during crurorrhaphy on disintegrated, atrophically altered tissues in case of abiotrophy of the diaphragm crura, and large defects with significant tension, leads to eruption of the sutures, displacement of the fundoplication cuff to the posterior mediastinum and recurrence of HH or formation of a paraesophageal hernia [8, 9, 10].

Introduction of laparoscopic technologies enabled performing one-stage surgical interventions

when cholelithiasis is combined with GERD and HH. Laparoscopic surgical interventions for the aforementioned pathology are less traumatic, provide good results in 88.5-94% of patients during follow-up periods of more than 10 years [11, 12]. However, despite the constant improvement of modern methods of diagnostic assessment and simultaneous surgical correction of this comorbidity, today there is neither single treatment strategy, nor the choice of the optimal method for correcting HH and GERD in cholelithiasis.

Objective of the work: patients with cholelithiasis, combined with GERD and HH and to determine the optimal methods of surgical correction of the hernial defect.

Materials and Methods

The work is based on a clinical analysis of the results of examination and treatment of 70 patients suffering from GERD and HH in combination with cholelithiasis. The main group consisted of 36 patients who underwent simultaneous operations for HH and GERD combined with cholelithiasis using an advanced technique for choosing surgical tactics. In addition, original research has been performed in the setting of endoscopy and surgery department of the Bukhara Branch of the Republican Research Center of Emergency Medical Care between 2020 and 2022.

The control group included 34 patients with GERD and HH who had previously undergone laparoscopic cholecystectomy for cholelithiasis. All patients in the control group underwent laparoscopic surgical treatment of HH and GERD

using current standards for choosing surgical tactics.

Distribution of patients by sex and age is similar to the one in the control and main groups. The age of the patients varied between 23 and 76. Among them prevailing were the females aged 40-60 and above (Table 1).

Table 1 – Distribution of patients by sex and age

Sex and age	Patients groups			
	Main group		Control group	
	(N = 36)		(N=34)	
Male	Abs	%	Abs	%
20-40 y.o.	1	2.8	3	8.8
40-60 y.o.	8	22.2	9	26.5
60 y.o. and above	6	16.7	4	11.8
Total	15	41.7	16	47.1
Females	Abs.	%	abs.	%
20-40 y.o.	4	11.1	4	11.8
40-60 y.o.	10	27.8	9	26.5
60 y.o. and above	7	19.4	5	14.6
Total	21	58.3	18	52.9

In the preoperative period the patients were examined in full according to the standard scheme, including complaints, history taking, physical examination, blood and urine tests, and instrumental research methods, including electrocardiography, lung radiography, abdominal ultrasound, esophagogastro-duodenoscopy, radiopaque polypositional examination of the esophagus, stomach and duodenum.

When choosing a surgical tactic for HH correction in the main group, we were guided by the methodology developed at the department. This technique is based on the intraoperative determination of the complexity of the hiatal hernia correction in the form of a scoring of the corresponding coefficient according to the formula:

$F = D + G + H + HAS$, where:

F is HH correction complexity index;

D is the severity of duodenogastric reflux;

G is the severity of gastroesophageal reflux (GER);

H is the severity of HH;

HAS is a measure of the area of the hiatal opening.

Each indicator was evaluated on a point system as follows.

D – presence of duodenogastric reflux (endoscopically preoperatively): 0 points means no reflux; 1 point means there is reflux.

G is the severity of GER (endoscopically preoperatively):

No GER – 0 points;

1st degree – 1 point;

2nd degree – 2 points;

3rd degree – 3 points;

4th degree – 4 points;

H is the severity of HH (fluoroscopically preoperatively):

– 1st degree – 1 point;

– 2nd degree – 2 points;

– 3rd degree – 3 points;

HAS is the indicator of the area of the hiatal opening (intraoperatively):

– up to 4 cm² – 1 point;

– between 4 cm² and 8 cm² – 4 points;

– more than 8 cm² – 10 points.

HAS was calculated according to the method described by F.A. Granderath et al. in 2007, which consisted in intraoperative instrumental measurement of the length of the diaphragm crura (R, cm), the distance between the extreme points of the maximum distance between the crura of the diaphragm (S, cm) and the calculation using 4 formulas:

1) $\alpha_1 = \arcsin(S/2)/R$;

2) $\alpha_0 = 2 \times \alpha_1$;

3) $B = \pi \times R \times \alpha_0 / 180$;

4) $HAS = B \times R / 2$;

Is an indicator equal to the value of arcsin – half the distance between the extreme points of the maximum distance between the crura of the diaphragm, divided by R – the length of the crura of the diaphragm in cm;

alpha 0 is an indicator equal to alpha 1 multiplied by 2;

B – radial index, calculated according to formulas of multiplication – the values of π (3.14) are multiplied by R – the length of the diaphragm crura and multiplied by the resulting value alpha 0 and divided by 180;

HAS is an indicator of the area of the hiatus opening (cm²), equal to the product of the obtained value B by half R.

Depending on the data obtained, the tactics of surgical correction of HH was chosen.

At $F \leq 5$, anterior crurorraphy was performed. At values of $5 \leq F \leq 12$, posterior crurorraphy was performed.

At $F > 12$ values, posterior crurorraphy and diaphragmocruroplasty were performed with a non-adhesive mesh explant.

After performing surgical correction of HH in patients of the main group, antireflux fundoplication was performed according to the original technique developed at the department using reinforcement of crurorraphy with the stomach wall.

Cholecystectomy was performed at the last stage using previously installed trocars.

In the control group, the choice of tactics for surgical correction of HH was based on the value of the area of the hiatal opening HAS.

At HAS values ≤ 4 cm², crurorraphy was performed by placing 1-3 sutures on the crura of the diaphragm, whereas at HAS values between 4 cm² and 8 cm², crurorraphy was performed in combination with diaphragm cruroplasty using a mesh explant; at HAS values over 8 cm², “Tension-free” plastics was performed which consists of diaphragm cruroplasty with a mesh explant.

Results and Discussion

All patients in the control group underwent laparoscopic cholecystectomy for cholelithiasis in various clinics and at various times over the past 10 years. The diagnosis of concomitant GERD and HH was established in 12 (35.3%) patients in the control group prior to LCE. In all these patients, reflux complaints intensified after LCE.

In the remaining 22 (64.7%) patients of the control group, targeted diagnostics of GERD and HH were not performed prior to LCE. However, all these patients had a history of characteristic reflux complaints prior to LCE, which also intensified in the postoperative period, which forced these patients to undergo endoscopic and radiopaque studies, upon which they were diagnosed with GERD and HH. Patients in the main group were most often diagnosed with stage II-III GERD associated with some I-II stage HH. The distribution of patients depending on the factors of choice of surgical tactics according to the original formula is presented in Table 2. In the control group, all patients underwent laparoscopic correction of esophageal hiatus with posterior crurorraphy supplemented by alloplasty – (table 2) 5 patients (14,7 %).

All operations in the group were combined with Nissen fundoplication (floppy) – in 16 (47.1 %) patients with II-III degree HH and Dora – Harrington in 18 (52.9 %) patients with stage I HH. In the main group, laparoscopic correction of HH was performed using anterior crurorraphy in 14 patients (38.9%), using posterior crurorraphy in 15 patients (41.7%), using combined anterior and posterior crurorraphy in 7 (19.4%) patients, supplemented by alloplasty in 4 (11.1%) patients. All operations in the main group were combined with fundoplication modified by the Department of Endoscopy and Surgery and ended (table 3) with cholecystectomy.

Table 2 – Distribution of patients in the main and control groups according to the factors of choice of surgical tactics

Patients groups		Main group (N = 36)		Control group (N=34)	
Factors		Qty	%	Qty	%
HAS	Less than 4 cm ²	28	77.8	26	76.5
	4 – 8 cm ²	5	13.9	6	17.6
	8 cm ² and >	3	8.3	2	5.9
GER severity	1 st degree	3	8.3	4	11.8
	2 nd degree	12	33.3	13	38.2
	3 rd degree	14	38.9	12	35.3
	4 th degree	2	5.6	1	2.9
HH severity	1 st degree	24	66.7	20	17.7
	2 nd degree	8	22.2	8	23.5
	3 rd degree	4	11.1	5	14.7
Presence of DGR		32	88.9	31	91.2
F	Less than 5	22	61.1	25	73.5
	5-11	11	30.6	7	20.6
	>12	3	8.3	2	5.9

During the follow-up period of 2-5 years or more, it was revealed that in the main group of patients (N=36) there were no recurrences of GERD and HH. No complications were found in the postoperative period.

In the control group of patients (N=34), 2 (5.9%) relapses of GERD and HH were revealed followed by repeated laparoscopic surgical interventions with alloplasty of recurrent HH and floppy-Nissen fundoplication.

In 1 (2.9%) patient of the control group after laparoscopic HH alloplasty and Nissen fundoplication, dysphagia was observed with the formation of a stricture of the esophageal-gastric junction around application of the alloplasty cuff, which required several sessions of balloon dilatation.

The choice of surgical tactics in the control group was based upon the standard method for determining the area of the hiatus opening without considering the above factors.

According to the statistics calculations using the determination of Student's t-criterion, a statistically significant difference was found between the effectiveness of treatment in the main and control groups (significance level $p < 0.05$).

It has been statistically confirmed that improved results of treatment of patients in the main group were reliable in comparison to the one in the control group. In this regard we can say that the factors taken into account in the original formula for calculating the choice of surgical tactics involving treatment of combined pathology are of fundamental importance.

Table 3 – Results of treatment and further observation of patients

Group	Main (N=36)		Control (N=34)	
	Abs.	%	Abs.	%
Anterior cruroraphy	14	38.9	-	-
Posterior cruroraphy	15	41.7	34	100
Combined cruroraphy	7	19.4	-	-
Alloplasty of HH	4	11.1	5	14.7
Relapse of GERD and HH	-	-	2	5.9

Conclusions

1. Insufficient diagnosis, as well as underestimation of already obtained diagnostic reflux data in cholelithiasis, and failure to perform appropriate surgical correction of GERD in LCE leads to the progression of reflux symptoms and requires additional surgical intervention and additional anesthesia, respectively.

2. The presence of comorbidity (cholelithiasis with GERD and HH) requires a multifactorial approach to the choice of tactics of surgical treatment, taking into account the severity of GER and HH, the

presence of DGR, bile and the area of the hernial orifice.

3. The developed method of laparoscopic surgical correction of GERD and HH in combination with cholelithiasis allows avoiding the development of "cuff", "mesh" and other postoperative complications.

4. Optimized tactics of simultaneous laparoscopic surgical interventions when cholelithiasis is combined with GERD and HH enabled improving the results of treatment of these patients by reducing early and late reflux complications, reducing relapses and improving the quality of life.

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