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**ABSTRACT**

**of the thesis for the degree of Doctor of Philosophy**

**SURGERY OF CALCULOSIS CHOLOCISTITIS  
IN PATIENTS WITH LIVER CIRROSIS  
MODERN APPROACHES TO TREATMENT**

**Speciality:** 3213.01 - Surgery

**Field of science:** Medicine

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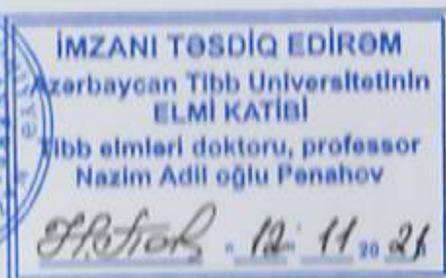
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## GENERAL CHARACTERISTICS OF WORK

**The actuality of the subject.** It is well known that cirrhosis of the liver, the last stage of pathological development of a wide range of chronic liver diseases, is a comorbid disease with complications.<sup>1</sup>

Approximately 10% of patients with cirrhosis require scheduled and emergency surgery.<sup>2</sup>

Historically, patients with cirrhosis have been considered inadequate candidates for surgery. For liver dysfunction, surgery is an additional source of stress, and in these patients, surgery is often complicated. Such a high surgical risk in patients with cirrhosis is due to the pathophysiology of liver disease and related factors, including portal hypertension, coagulopathy, adaptive immune system dysfunction, cardiomyopathy, renal failure, hepatopulmonary syndrome.<sup>3</sup>

Retrospective studies have shown that in patients with cirrhosis who have undergone surgery, complications reach 30% and mortality 25%.<sup>4</sup>

Preliminary assessment of the functional status of the liver, optimization of patients in the preoperative period, forecasting the risk of intraoperative, postoperative complications are important factors in improving treatment outcomes in these patients.

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<sup>1</sup> Bayramov, N.Y., Novruzov, N.H., Güraras, A.S., Sirrotik xəstələrdə kritik vəziyyətlərə ümumi yanaşma prinsipləri // – Cərrahiyyə 2013; 2; 26-29  
Schuppan D., Afdhal N.H. Liver cirrhosis //Lancet. 2008; 8; 371 (9615): 838-851.

<sup>2</sup> Pandey C.K., Karna S.T., Pandey V.K., Tandon M., Singhal A., Mangla V. Perioperative risk factors in patients with liver disease undergoing non- hepatic surgery // World J. Gastrointest. Surg. 2012; 4(12): 267-274. doi 10. 4240/wjgs. V4. I12.267.

<sup>3</sup> Douard R., Lentschener C., Ozier Y., Dousset B. Operative risks of digestive surgery in cirrhotic patients // GastroenterolClinBiol 2009; 33: 6-7: 555-564.  
Friedman L.S. Surgery in the patient with liver disease // Trans. Am. Clin. Climatol. Assoc. 2010; 121: 192- 204.  
Bhangui P., Laurent A., Amathieu R., Azoulay D. Assessment of risk for non-hepatic surgery in cirrhotic patients // J.Hepatol 2012; 57: 4: 874- 884.

<sup>4</sup> Friedman L.S. Surgery in the patient with liver disease // Trans. Am. Clin. Climatol. Assoc. 2010; 121: 192- 204.

The severity of liver cirrhosis is usually assessed using Child-Turcotte-Pugh (CTP) and end-stage stage model of liver disease (MELD) scales.<sup>5</sup>

Emergency surgery, cardiovascular and open abdominal surgeries are characterized by higher mortality in patients with cirrhosis.<sup>6</sup>

Although liver transplantation is the main operation in patients with cirrhosis, other interventions are performed, including esophageal, gastrointestinal, biliary, and hernia surgeries.

Cholecystectomy is one of the most common gastrointestinal surgeries in patients with cirrhosis.<sup>7</sup> The main reason for this is the prevalence of gallstones in them: cholelithiasis is about 2-3 times more common in patients with cirrhosis than in the general population.<sup>8</sup>

The reasons for the high prevalence of gallstones in patients with cirrhosis are associated with metabolic changes in the liver: decreased synthesis of bile acids, increased levels of free bilirubin as a result of intravascular hemolysis, hypokinesia of the gallbladder.

Like other abdominal surgeries, biliary interventions are also performed in patients with cirrhosis associated with a number of risk factors. The risk of acute cholecystitis and emergency biliary surgery is particularly high.<sup>9</sup> Changes in portal hypertension, ascites, encephalopathy, jaundice, hypoalbuminemia, coagulopathy, anemia, and similar changes that develop on the basis of cirrhosis are factors that may increase postoperative mortality in patients with cirrhosis.

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<sup>5</sup> Neeff H., Mariaskin D., Spangenberg H.C., Hopt U.T., Makowiec F. Perioperative mortality after nonhepatic general surgery in patients with liver cirrhosis: an analysis 138 operations in the 2000s using Child and MELD scores // *J Gastrointest Surg*, 15 (2011), pp. 1-11.

<sup>6</sup> De Goede B., Klitsie P.J., Lange J.F. et al. Morbidity and mortality related to non-hepatic surgery in patients with liver cirrhosis: a systematic review // *Best Pract Res Clin Gastroenterol* 2012; 26: 1: 47-59.

<sup>7</sup> Chmielecki D.K., Hagopian F.J., Kuo Jen-Hong, Kuo Y.L., Davis J.M. Laparoscopic cholecystectomy is the preferred approach in cirrhosis: a nationwide, population-based study // *Oxford: HPB*; 2012; 14(12):848-853.

<sup>8</sup> Acalovschi M., Gallstones in patients with liver cirrhosis. Incidence, etiology, clinical and therapeutical aspects // *World J Gastroenterol*. 2014; 20 (23): 7277-7277 doi 10.3748/wj9.v.20.i.2D.i.23.7277.

<sup>9</sup> Douard R., Lentschener C., Ozier Y., Dousset B. Operative risks of digestive surgery in cirrhotic patients // *Gastroenterol Clin Biol* 2009; 33: 6-7: 555-564.

The surgical literature of the recent past has consistently reported unsatisfactory outcomes of open bile duct surgery in cirrhosis and portal hypertension: a number of studies have shown that complications and mortality reach 23% and 25%, respectively. The main causes of such undesirable outcomes were excessive satiety, postoperation liver, renal failure, sepsis. Even at the beginning of the LXE method, the use of this operation in patients with cirrhosis was questionable.

Later, the experience gained in laparoscopic surgery, increased skill, led to the successful implementation of a new type of operation in a number of difficult cases associated with the gallbladder, including patients with cirrhosis.

However, in the literature, there is a wide range of complications and mortality in patients with cirrhosis of this operation. On the other hand, there are difficulties in the preoperative diagnosis of liver cirrhosis itself, and in many cases the disease occurs unexpectedly during surgery.

Lack of experience in the use of laparoscopic technology in gallbladder surgery in patients with cirrhosis also does not allow to reach a general consensus in choosing the optimal type of surgery in these patients.

**Object of research** - Patients who received LXE in 2010-2017.

**Subject of research** - Application of LXE surgery in patients with cirrhosis.

**The purpose of the study** Improving the preoperative diagnosis of liver disease in patients with cirrhosis and gallstones, and the development of surgical tactics that will ensure the safety of the use of laparoscopic technology in gallbladder surgery in these patients.

Research objectives:

- Clarification of the incidence of liver cirrhosis in patients undergoing laparoscopic cholecystectomy and analysis of the results of the operation;

- Development of an algorithm that improves the diagnosis of latent hepatic cirrhosis in patients indicated for surgical treatment of gallstones and evaluation of its effectiveness in clinical practice;

- Substantiation of indications for the use of laparoscopic

technology in the treatment of gallstones in patients with cirrhosis, improvement of surgical risk prediction and development of surgical tactics to ensure the safety of the operation;

- To study the specifics of this intervention in patients with cirrhosis on the basis of comparative analysis of the indicators of video endoscopic cholecystectomy in patients with cirrhosis and non-cirrhosis;

- Development of a complex for the prevention and treatment of intra- and postoperative complications encountered in laparoscopic gallbladder surgery in patients with cirrhosis.

**Research methods:** clinical examinations, laboratory tests

**Instrumental examination methods:** USM, QDE, CT, MRI, FEQDS.

**The main provisions of the defense:**

- The steady increase in the number of patients with chronic liver disease and its final stage, cirrhosis, increases the risk of developing this disease during surgery;

- Indications for laparoscopic cholecystectomy in patients with cirrhosis should be substantiated, the risk of surgery in the preoperative period should be adjusted to the severity of gallstone disease;

- Preparation for laparoscopic cholecystectomy in patients with cirrhosis should be carried out taking into account the severity of functional changes in the liver and the general status of patients;

- Laparoscopic cholecystectomy, like other operations in patients with cirrhosis, should be considered a complex operation and should be performed by a surgeon with sufficient experience in open and laparoscopic surgery;

- In patients with cirrhosis, a safer surgical option should be chosen in difficult intraoperative situations;

**Research scientific innovation:**

- The incidence of liver cirrhosis in laparoscopic cholecystectomy was studied and an algorithm was developed to provide early diagnosis of this disease;

- The severity of liver cirrhosis and the associated surgical riskn weight measurement a modified version of the CTP classification has

been developed to increase objectivity;

- The possibility and safety of laparoscopic cholecystectomy in the treatment of cholecystolithiasis in patients with cirrhosis are substantiated, the indications for surgery are clarified;

- On the basis of a comparative study of the results of laparoscopic cholecystectomy in patients with cirrhosis and non-cirrhosis, the specific features of the implementation of this intervention against the background of cirrhosis were identified;

- The dynamics of functional changes in the liver after laparoscopic cholecystectomy in patients with cirrhosis was studied, ways to correct them were shown.

**Approbation of the thesis.** Discussion of the dissertation at a joint meeting of employees of the departments of I surgical diseases, II surgical diseases, III surgical diseases, general surgery of the AMU (14.02.2019, protocol No. 1), as well as at the seminar of the dissertation council ED 2.06. works on AMU (14.04.2021, protocol No. 2). The results of the dissertation at the XIII International Eurasian Conference of Surgeons and Gastroenterologists (Baku 2013), Azerbaijan-Turkish Days of Surgery and Gastroenterology. At the scientific-practical conference (Baku 2017) Actual problems of medicine. Scientific-practical conference (Baku, 2017), 6th International and 5th Mediterranean conferences of bariatric and metabolic surgeons (Antalya, 2019), XVIII International conference of surgeons and hepatogastroenterologists (Baku, 2019), International scientific-practical conference "Innovations in surgery" (Minsk, 2019).

**Practical significance of the research.**

- The examination algorithm, which provides accurate diagnosis of chronic liver diseases, including cirrhosis of the liver in the preoperative period, will allow more effective preparation for surgery;

- Assessment of the severity of cirrhosis and surgical risk based on the proposed prognostic system option will help optimize patient selection for surgery;

- The proposed surgical tactics in intraoperative technically

difficult situations encountered during laparoscopic cholecystectomy in patients with cirrhosis will allow to reduce complications.

**Application of research results.** The results of the dissertation were applied in Baku City Clinical Hospital No. 5, AMU Teaching Surgery Clinic, City Hospital and Oxygen private clinics.

16 scientific works on the topic of the dissertation (6 articles, 2 without co-authors, including 2 foreign journals, 6 theses) were published in periodicals included in the International System of Summary and Indexation.

**Name of the organization where the dissertation work is performed.** The dissertation work was carried out on the clinical bases of the 2nd Department of Surgical Diseases of Azerbaijan Medical University.

**Volume and structure of the dissertation.** Introduction to the dissertation, 4 chapters, literature review, results, It consisted of a bibliographic list of 199 sources cited, 134 pages of text, 22 pictures, 26 tables.

## MAIN CONTENT OF THE STUDY

**At the entrance** relevance of the topic, purpose and task of the work, research methods, scientific-theoretical and practical significance of the work, defended provisions, volume, structure of the dissertation, etc. brief information about.

Dissertation work "Literature review. The first chapter, entitled "Cirrhosis of the liver and cholecystectomy", consists of seven sub-chapters. There was a discussion of cirrhosis of the liver, its risk in anesthesia and surgery, and the problems of LXE in patients with cirrhosis.

"The second chapter, entitled "Research Materials and Methods", consists of three sub-chapters. Patients with and without cirrhosis under observation in this chapter, the examination methods used (laboratory tests, USM, Fibroscan, FEQDS, FEQDS, CT, MRI) are listed.

Dissertation work "The third chapter "Results of preoperative examination of patients with laparoscopic cholecystectomy" consists

of nine sub-chapters. The results of the examination methods mentioned in the previous chapter and the forecasting of operational risk are discussed here.

**Chapter four** “Cirrhosis and laparoscopic cholecystectomy” called and this chapter seven consists of half a chapter. This chapter analyzes preoperative preparation in patients with cirrhosis, anesthesia, LXE techniques in patients with cirrhosis, difficulties, proposed surgical tactics and the results of the intervention.

In 2010-2017, LXE surgery was performed on 1540 patients for cholecystolithiasis in the clinical bases of the 2nd Department of Surgical Diseases of Azerbaijan Medical University. The analysis of 48 patients (main group) with liver cirrhosis in these patients is the basis of the current study. In addition, the study included data from 50 patients without liver cirrhosis who underwent laparoscopic cholecystectomy for a comparative study (control group). All of these patients underwent surgery for cholecystolithiasis. Patients with complications of gallstone disease such as acute pancreatitis, obstructive jaundice, cholangitis were not included in the study.

Of the patients with cirrhosis, 30 are women and 18 are men. Age ranges from 23 to 78, averaging  $50 \pm 8.4$  (Table 1).

Indications for surgery in 22 patients (45.8%) with acute calcification cholecystitis and 26 patients (54.2%) had chronic stones cholecystitis was.

The etiological factor of liver cirrhosis was viral hepatitis in 34 patients (70.8%), non-alcoholic liver steatohepatosis in 7 patients (14.6%), alcoholism in 5 patients (10.4%), and in 2 patients (4.2%). none of the reasons were recorded.

In 28 patients (58.3%) 35 concomitant diseases were registered: cardiovascular disease 20, diabetes mellitus 11, respiratory system disease - 3, kidney disease - 2.

The anesthesia risk assessed on the ASA scale was primary (66.7%) in 32 patients and secondary (33.3%) in 16 patients.

Table 1

Demographic and clinical parameters of patients with cirrhosis after laparoscopic cholecystectomy

Indicators	LXE n = 48
Gender: male / female	18/30 (37.5-52.5%)
Age years (range)	50.5 ± 6.4 (23-74%)
Etiology of cirrhosis	
- Hepatitis C.	17 (35.4%)
- Hepatitis B.	12 (25%)
- Hepatitis C and B.	5 (10.4%)
Alcohol	5 (10.4%)
Metabolic disease	7 (14.6%)
The reason is unknown	2 (4.2%)
Co-morbidities	28 (58.3%)
Class A of CTP	36 (75%)
Class B of CTP	12 (25%)
Diagnosis of cirrhosis	
- preoperative	32 (66.5%)
- in-operation	16 (33.6%)
Instructions for operation:	
- acute cholecystitis	22 (45.8%)
- chronic cholecystitis	26 (54.2%)
Duration of the operation, min.	75.5 ± 14.4
Conversion to open operation	3 (6.3%)
Postoperative complications	11 (22.9%)
Days of hospital stay	2.5 ± 0.8
Death	0

The severity of liver cirrhosis according to the CTP classification was 36 patients (75%) class A and 12 patients (25%) class B.

Jaundice according to the results of clinical-laboratory and instrumental examinations 13 in the patient (27.1%), ascites 8 (16.6%), splenomegaly 34 (70.8%), esophageal varices 17 in the patient (35.4%) were registered. 22 patients (47.9%) were operated on urgently and 26 patients (52.1%) were operated on as planned.

Patients were diagnosed with liver cirrhosis in the preoperative period in 32 (66%) and during surgery in 16 patients (33.4%).

In order to improve the diagnosis of latent liver cirrhosis, a

special diagnostic algorithm developed in the preoperative examination of patients was used (Table 2).

During preoperative preparation, the severity of liver cirrhosis and the associated risk of surgery were assessed in 36 patients with the classic CTP classification, and in 12 patients with its proposed modification. The essence of the proposed modification is to include in the classification of CTP two parameters that are important in the diagnosis and prognosis of liver cirrhosis - the severity of hepatic fibrosis, measured by QDE, and the rate of bleeding from the esophageal veins (Table 3). These symptoms increase the possibility of a more objective assessment of the severity of patients with cirrhosis and the associated surgical risk. Macroscopically, 15 cases of macronodular cirrhosis and 33 cases of micronodular cirrhosis were registered. Dilated venous collaterals during surgery were found in 14 patients (29.2%) in has been. In 4 of them, dilated vessels were found in the fat or gallbladder joint adjacent to the gallbladder, in 6 in the hepatoduodenal ligament, and in 4 in the adhesions and ligament. Free gallbladder from adhesions was found in 16 patients. Tension on the inflamed gallbladder was performed after the bladder was punctured and emptied. Varicose vein adhesions were dissected using a bipolar coagulator and ligature.

Take a biopsy from the liver parenchyma in 17 patients during surgeryüdiéd. In the remaining patients, this procedure was not performed due to the patient's lack of prior consent or suspected cirrhosis. The need for blood transfusion during the operation arose in 2 patients.

Special preoperative preparation was performed in CTP class B patients.

The operations were performed under endotracheal anesthesia with the use of muscle relaxants.

Laparoscopic cholecystectomy was performed using the standard 4-port method, the American version. The first 10 mm

Table 2

Preoperative diagnostic algorithm in patients at high risk of liver cirrhosis

Evaluation on CTP classification

\* TPX- transparietal cholecystostomy

\* EST-endoscopic sphincterotomy

Table 3

Severe modification of liver cirrhosis  
Child-Turcotte-Pugh classification

Child-Turcotte-Pugh classification			
Clinical and laboratory criteria	Points		
	1	2	3
Encephalopathy	No.	Light	severe (coma)
Assit	No.	Minimal, taken with treatment	Total, non-retractable
Bilirubin, mg / dl mmol / l	<2 > 34	2-3 34-51	> 3 > 51
Albumin, g / dl q / l	> 3.5 35	2.8-3.5 28-35	<2.8 <28
Prothrombin time, seconds International Normalization Coefficient	<4 <1.7	4-6 1.7-2.3	> 6 > 2.3
Degree of liver fobrosis (ultrasound elastometry)	F2-F3	F3-F4	F4
Varicose veins	No.	yes, don't bleed	there, with bleeding
M Distribution of patients to classes according to the sum of points in the CTP classification			
Class A = 7 to 9 (mild liver disease)			
Class B = 10 to 13 (moderate liver disease)			
Class C = 14 to 21 (severe liver disease)			

- - Modification  
\* M CTP-modified CTP

trocars, navelnot to damage the veinfor the purpose, was included from the subumblic area. The second subsymphoidal trocar was inserted 2-3 cm to the left of the midline under the supervision of a video camera to prevent damage to the sickle ligament veins. Two 5 mm trocars were also inserted from non-vascular areas, under visualization of the anterior abdominal wall with transabdominal illumination. In patients with cirrhosis, given that pneumoperitoneum can adversely affect the liver and kidney circulation, intra-abdominalzstack relatively low, 7-10 mm.c.süt. tried to maintain the level. LXE was performed subtotal in 6 patients with cirrhosis. In all laparoscopic operations, the abdominal cavity was drained with one or two tubes. At the end of the operation, the subhepatic area 3-4min.kept under visual control, removed from the abdominal cavity after complete confirmation of hemostasis. The holes of all ports have been carefully inspected for internal and external bleeding. In order to monitor changes in the functional state of the liver in patients with cirrhosis, 12 patients underwent a series of biochemical tests of this organ (bilirubin, ALT, AST, QQT, albumin, INR) 1, 3, 5-6 days of preoperative and postoperative period were studied.

Statistical processing “Statistics for windows and 6 Stat Soft Inc. (USA) programs” was carried out with the help of EXCEL 7.0 (Microsoft) spreadsheets of the package.

**Results.** In 45 of the 48 patients who underwent laparoscopic cholecystectomy, the intervention was completed endoscopically, and in 3 patients it was open.la transition was obtained (6.3%). The reason for the change in the method of surgery was bleeding in one patient, which could not be stopped endoscopically, and in two patients, indurative inflammatory infiltration in the neck of the gallbladder. Subtotal cholecystectomy (SCHE) was performed in 6 patients with cirrhosis due to gallbladder complications. Four of them are the gallbladderthe posterior wall was retained in the hepatic bed (SXE I), in 2 patients the sac was cut from the cervical region (SXE II), and in one of them both methods were applied simultaneously (SXEIII). Partial incision of the gallbladder was performed using a hook or bipolar coagulator, ligature (Figure 1).

During endoscopic intervention, bleeding from approximately 50 ml to 200 ml was reported in 8 patients with cirrhosis (15.2%).

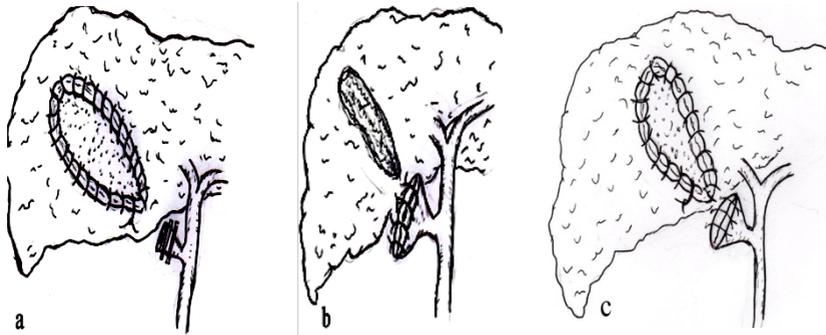


Figure 1. Subtotal cholecystectomy

- a) SXE-I The posterior wall of the gallbladder is stored in the liver.
- b) SXE-II The gallbladder is cut at neck level.
- c) SXE-III = SXE I + SXE II.

The source of bleeding is mainly adhesions around the gallbladder, the bed of the gallbladder in the liverbed. Significant bleeding ( $\leq 250$  ml) was observed in 2 patients (4.3%). In one of them, the bleeding from the gallbladder bed was very intense, and the bleeding was stopped by sutures with the transition to open surgery. In another patient, the source of bleeding was the gallbladder artery, which was temporarily stopped by inserting a tampon and the bleeding vessel was removed and clipped to the dissector. Other bleeding was minor and stopped by endoscopic means.

The duration of laparoscopic surgery in patients with cirrhosis ranged from 30 minutes to 130 minutes and averaged  $75.5 \pm 14.4$  minutes. Long-term surgery has been observed in patients with acute cholecystitis and in the transition to the open method. Drainage tubes were removed from the abdomen in the first 2 or 3 days after surgery in most patients. In only 4 patients, they were removed on days 5–6 due to bloody fluid and ascites from the drainage tubes. The course of the postoperative period was uncomplicated in the vast majority of patients. In total, 16 postoperative complications were reported in

eleven patients (22.6%). Symptoms of mild hepatic insufficiency (drowsiness, increased bilirubin in the blood, changes in ALT, AST, leakage of ascites) were observed in 3 patients. The changes were eliminated by conservative treatment measures. Leakage of ascites fluid from the drainage tube placed in the abdominal cavity was recorded in 3 patients. In one patient, 50-100 ml of ascites fluid leaked in the first 1-2 days of the postoperative period increased to 400-500 ml on days 3-4. In the following days it decreased to 6- decreased to 50 ml per day. The subjective condition of the patients remained satisfactory. Leakage of up to 200 ml of serous-hemorrhagic fluid from the drainage tube in the first postoperative days was observed in 7 patients, on the 3rd day of surgery drains were cut. Another patient had bleeding as soon as the drainage tube was removed from the 5 ml port hole and needed to cut the bleeding with a suture. Paraumbilic wound seroma 3, abscess 4, hematoma were registered in 2 patients. Between the 3rd and 7th days after surgery, seromas detected by USM were treated with one or more puncture-aspirations. In one of the patients with cirrhosis who underwent laparoscopic surgery, a repeat open operation was performed. This patient showed signs of intestinal obstruction on the 10th day after surgery, and CT scan of the abdomen revealed an eventration of a small intestinal loop in the paraumbilic wound area. Hernioplasty was performed with repeated open surgery and canceled eventration. Dynamic study of liver biochemical tests in the preoperative period and postoperative days gave the following results: high bilirubin, ALT, Is there an increase in AST or creatinine on the first day after surgery?§, on the third and sixth days, the levels of these parameters dropped to preoperative levels. Bilirubin, creatinine, QGT and INR fell below pre-operational levels. The length of hospital stay of LXE patients was between 2-6 days and the mean was  $2.5 \pm 0.8$  days. The vast majority of patients are discharged home on the 1st or 2nd day after surgery. Only 3 patients with signs of hepatic dysfunction, including ascites from the drainage tube, were treated at the clinic for 4-6 days (Table 4).

Of the non-cirrhotic patients who underwent LXE, 17 were male (34%) and 33 were female (66%). The age range is between 20-

79, with an average of  $49.3 \pm 12.5$ . 21 (42%) patients were operated on for acute stone cholecystitis and 29 (48%) for chronic stone cholecystitis. The operations were performed in these patients without serious complications. Significant bleeding (200 ml) was reported in 2 patients. Postoperative complications were reported in a total of 6 patients (12%). The length of hospital stay was  $1.5 \pm 0.9$  days. In the analysis of the results of operations in the studied patients, the duration of interventions, intraoperative complications, the course of the postoperative period, the days of patients' stay in the clinic, the course of rehabilitation and a number of other indicators were studied.

Table 4

Surgery and postoperative in the study groups  
walking characteristics

Settings	Patients with cirrhosis	Patients without cirrhosis	P
	LXE (n = 48)	LXE (n = 50)	
	2	3	
Operating time, min.	$75.5 \pm 14.4$	$41.7 \pm 12.5$	<0.05
Intraoperative bleeding, ( $\leq 200$ ml)%	8 (16.6%)	2 (4%)	<0.01
Conversion	3 (6.3%)	2 (4%)	>0.05
Postoperative liver failure	3 (6.2%)	-	
Postoperative bleeding, % ( $\leq 200$ ml)	7 (14.5%)	2 (4%)	<0.01
Repeat operation	1 (2.1%)	-	
Wound pus	4 (8.3%)	2 (4%)	<0.05
Duration of hospital stay, days	$2.5 \pm 0.8$	$1.5 \pm 0.9$	>0.2
Death	-	-	
Ascites fluid leakage	3 (6.25%)	-	

**Discussion.** Liver cirrhosis abdominal operations is not a rare event. In our study, it was found in 3.11% of patients treated with LXE. In the literature, 2.19% -8.54% of liver cirrhosis is detected during surgery.

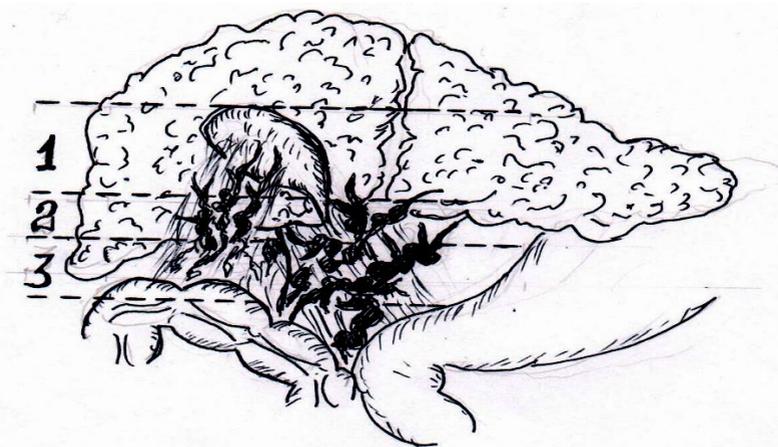
Liver cirrhosis was recorded as a surgical finding in 33.4% of patients was obtained. The diagnostic algorithm we developed in accordance with the objectives of this study was used in the preoperative examination of 10 patients at high risk of cirrhosis. Hepatic cirrhosis (F4) in 8 patients by indirect liver elastography included in the examination plan, 2-also show liver fibrosis (F3) has been. The results of the examination were confirmed during the operation.

The average duration of LXE surgery in patients with cirrhosis is 75 in our patients min. has been and approximately corresponds to the literature data. This time is longer than that of patients without cirrhosis (41 minutes). The transition from laparoscopic surgery to the open method due to intraoperative difficulties occurred in 3 patients with cirrhosis (6.3%). In recent years, literature reviews have shown that this figure ranges from 0-9%. Endoscopic bleeding and inflammatory infiltration of the gallbladder, anatomical abnormalities caused by the transition to the open method happens. In patients with cirrhosis of the liver, we have developed a surgical "safety map" according to the degree of risk of bleeding from venous collateral lesions due to portal hypertension in the abdomen (Figure 2).

The most dangerous area of bleeding around the hepatoduodenal junction, which is difficult to stop, peritoneal pouch is considered. In case of sharply dilated venous vessels in this area, it is recommended to avoid manipulations and use subtotal cholecystectomy.

In our experience, there have been no deaths associated with laparoscopic cholecystectomy.

The most dangerous complication that can occur during surgery in patients with cirrhosis is bleeding. In our study, this complication was found in 16.6% of cases. However, significant bleeding ( $\approx$ 250-300 ml) was reported in 2 (4.1%) patients.



**Figure 2.** Distribution of the surgical site according to the degree of risk of damage to the venous collaterals enlarged from portal hypertension in gallbladder and bile duct interventions in patients with cirrhosis: 1) light area, careful work; 2) moderate area, etc.ox careful work; 3) heavy area, work should be avoided, use of LXE-II option.

Patients without cirrhosis of the liver had fewer cases of intraoperative bleeding (4.2% vs. 2%,  $p < 0.05$ ) compared with surgery in patients with LXE cirrhosis, and postoperative complications were low (22.9% vs. 12%,  $p < 0.05$ ), wound problems. Yes also less common. No statistically significant differences were found between the two groups during hospitalization.

The experience gained in laparoscopic cholecystectomy in patients with cirrhosis and the analysis of the literature on this topic lead to the following generalizations: scheduled and emergency operations can be performed in patients of class A of the CTP scale, without special preoperative preparation. In patients with class B CTP, emergency surgery should be considered risky, and planned interventions should be performed after recovery of impaired hepatic function, especially ascites, jaundice, and correction of coagulopathy. Both laparoscopic and open cholecystectomy in CTP class C

patients should be considered a contraindication. The mortality rate in these operations is very high (50-75%). Interventions on the gallbladder in patients with decompensated cirrhosis only with emergency instructions, surgery should be performed with native options (conservative treatment, puncture cholecystectomy).

Intraoperative satisfaction is the leading cause of almost all other serious complications in patients with cirrhosis. is considered. In difficult cases of the gallbladder (varicose veins, inflammatory infiltration, adhesions, anomalies), relatively less dangerous subtotal cholecystectomy can be used instead of radical surgery.

## RESULTS

1. Cirrhosis of the liver was found in 3.11% of patients who underwent laparoscopic cholecystectomy. Compensated Laparoscopic cholecystectomy is an effective and relatively safe operation in patients with cirrhosis of the liver. Changes in the basic functional parameters of the liver in the postoperative period are moderate and transient. The rate of transition from laparoscopy to open surgery is not statistically significant in patients with cirrhosis compared to similar patients in ordinary patients.
2. In 33.4% of patients with cirrhosis who underwent surgery, cirrhosis was diagnosed for the first time during surgery. The use of the proposed diagnostic algorithm in preoperative examinations of patients at high risk of cirrhosis (viral hepatitis, metabolic syndrome, alcoholism, etc.) increases the effectiveness of early diagnosis of this disease.
3. Surgical treatment of cholecystolithiasis in patients with cirrhosis. The findings are based on an assessment of the severity of liver disease and surgical risk should be done. The proposed modification of the Child-Turcotte-Pugh classification enhances the objectivity of this assessment.
4. Subtotal variants of cholecystectomy in complex interoperability findings that increase the risk of complications of laparoscopic cholecystectomy in patients with cirrhosis provides.

5. Patients with cirrhosis should be monitored regularly for signs of liver disease and complications associated with the intervention in the postoperative period, and appropriate treatment should be available.

## **PRACTICAL RECOMMENDATIONS**

1. In the preoperative period:
  - a) Screening of cirrhosis by indirect liver elastography in patients with indications for LXE surgery and at high risk of cirrhosis (viral hepatitis, alcoholism, obesity).
  - b) Prediction of surgical risk in patients with cirrhosis (CTP or its modified variant), preoperative drug optimization of patients (correction of ascites, coagulopathy, jaundice).
2. During the operation:
  - a) Placement of the first port in the subumbilic area, the subxyphoid port in the left of the midline, the other ports under laparoscopic transillumination, in non-vascular areas to prevent damage to the dilated vessels from portal hypertension in the anterior abdominal wall.
  - b) During surgery, the use of subtotal cholecystectomy in difficult cases of the gallbladder (eg, massive vascular adhesions around the gallbladder, inflammatory infiltration in the Kalot triangle, dilated veins, etc.).
  - c) Less use of gallbladder traction, blunt dissections in vascular areas.
  - d) Use of ligature, ultrasound scissors to minimize bleeding in dissections.
  - e) Consideration of liver biopsy, which may be important in the treatment of cirrhosis.
  - f) Strict monitoring of the reliability of hemostasis at the end of the operation.
3. In the postoperative period:

Monitoring of cirrhosis and possible complications of the operation itself.

**List of published scientific works on the topic of the dissertation:**

1. K.H. Sariyeva, Hadiyev S.I., Abdinov E.A. Laparoscopic cholecystectomy in patients with hepatic cirrhosis / Abstracts of XIII international euroasian congress of surgery and gastroenterology. Baku, 12-15 September, 2013, p.107.
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4. K.H. Sariyeva, S.I. Hadiyev, E.A. Abdinov. Laparoscopic cholecystectomy in patients with cirrhosis // "Surgery" magazine. Baku, 2016, №5, p.64-70.
5. K.H. Sariyeva, Hadiyev S.I., Abdinov E.A. On some problems of abdominal surgery in cirrhosis of the liver // Journal "Annals of surgical hepatology" Moscow, 2016, №4, p.63-69.
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15. K.H. Sariyeva. Laparoscopic cholecystectomy in patients with cirrhosis of the liver and without this disease: a comparative analysis of the results. // "Health" magazine. Baku, 2020, № 2, p.53-57.
16. K.H. Sariyeva. Accidental Richter's hernia suffocated at the paraumbilic trocar after laparoscopic cholecystectomy. // Baku, "Medicine and Science", 2020, № 2, p. 90-94.

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