American Journal of Medicine and Medical Sciences 2023, 13(5): 586-592
DOI: 10.5923/j.ajmms.20231305.08

The Effectiveness of Staged Surgical Tactics for the Treatment of Complicated Forms of Cholelithiasis in Elderly and Senile Patients

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Abstract Patients with complicated forms of cholelithiasis account for a significant proportion of hospital admissions, with elderly and senile patients being particularly affected. These patients often experience complications beyond acute inflammation of the gallbladder, such as bile duct lesions and concomitant pathologies, which can exacerbate the severity of the disease. Surgical treatment of complications in this patient group has been challenging, with high rates of septic conditions and mortality. However, advancements in minimally invasive surgical techniques and staged surgical tactics have led to a decrease in mortality and are recognized as effective by most clinicians. Objectifying the severity and prognosis of the disease is crucial for the development of promising treatment approaches, especially for complications such as abdominal and biliary sepsis, which have diverse clinical manifestations. The results of treatment of 171 elderly and senile patients with complicated forms of cholelithiasis are presented. Staged surgical treatment, taking into account the developed criteria for assessing the severity of the condition of patients and the predicted risk of postoperative complications with the use of preliminary minimally invasive decompression interventions on the biliary tract performed in 42.2% of patients of the main group, allowed to stop purulent-cholemic intoxication, improve the results of subsequent radical operations. In 15.6% of patients, these interventions were the final method of treatment. Priority staged use of minimally invasive interventions significantly reduced mortality, postoperative purulent-septic and extra-abdominal complications (3.1%, 12.4% and 29.9%, respectively), whereas in the comparison group these indicators were 8.1%, 32.4% and 41.9%. Elderly and senile patients who underwent simultaneous radical surgical correction for acute destructive cholecystitis or obstructive cholangitis had the highest percentage of mortality, purulent-septic and extra-abdominal complications. Biliary and abdominal sepsis, as well as cardiovascular and pulmonary complications, were the main causes of death. A stage-by-stage surgical treatment approach, using minimally invasive decompression interventions in 42.2% of patients, helped to stop purulent-cholemic intoxication and improve subsequent radical operations. In some cases, these interventions were the final treatment. A therapeutic and diagnostic algorithm based on the prevalence of destructive cholecystitis or obstructive cholangitis clinic allowed for laparoscopic cholecystectomy in 19.6% of patients and mini-laparotomy access in 64.9% of patients. By prioritizing staged use of minimally invasive interventions and optimizing tactical and technical aspects of surgical treatment for elderly and senile patients, mortality and postoperative complications were significantly reduced compared to a comparison group.

Keywords Cholelithiasis, Complications, Elderly and senile age

1. Introduction

Patients with complicated forms account for 54-65% of the number admitted to hospitals for cholelithiasis (CL). Among the patients operated with acute inflammation of the gallbladder, elderly and senile patients account for up to 30% [1,4,6,7,9]. Along with severe complications of acute inflammation of the gallbladder, lesions of the bile ducts are frequent in patients of older age groups (35-60%). Choledocholithiasis occupies the main place in the structure of bile duct lesions, accounting for 50-78% of all types of pathology [2,3,5,8,10]. In these patients, the severity of the underlying disease is aggravated by concomitant pathology. At the same time, in the acute period of the disease, the effect of mutual aggravation of the underlying and concomitant diseases is manifested.

In numerous studies, the results of surgical treatment of elderly and senile patients with complications of CL do not always satisfy specialists, in 40-65% of cases, septic

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Received: Apr. 14, 2023; Accepted: Apr. 26, 2023; Published: May 12, 2023
Published online at http://journal.sapub.org/ajmms

conditions occur in patients, as a result of which from 16.5% to 30.0% of observations end in death [11,12].

Objectification of the assessment of the severity of the condition and the prognosis of the disease is of particular importance for the development of promising directions for the treatment of complications of CL as abdominal and biliary sepsis, which is characterized by heterogeneity of clinical manifestations. In recent decades, due to the development of minimally invasive surgical interventions and the introduction of staged surgical tactics, mortality in complicated forms of cholelithiasis in elderly and senile patients has been decreasing. This is mainly due to the development of minimally invasive surgical interventions and the introduction of staged surgical tactics, the effectiveness of which is recognized by most clinicians.

2. Purpose of the Research

Improving the results of treatment of elderly and senile patients with complicated forms of cholelithiasis by optimizing the tactical and technical aspects of surgical correction with the priority use of minimally invasive interventions.

3. Material and Methods

The results of treatment of 171 elderly and senile patients with complicated forms of GI who were treated in surgical departments of the clinic of the Samarkand State Medical University in the period from 2015 to 2022 are presented. According to the classification adopted by the WHO Regional Office for Europe (2016), elderly patients (60-74 years old) there were 143 (83.6%), elderly patients (75 years and older) – 28 (16.4%). The oldest patient in the study was 87 years old. Female patients prevailed – 104 (60.8%), men – 67 (39.2%). The average age is 64.7±3.4 years, the ratio of women to men is 1.5:1.

Of 171 patients with complicated forms of GI, 130 (76.1%) were diagnosed with destructive forms of inflammation of the gallbladder, including 56 - gangrenous cholecystitis. In the structure of complications of bile duct lesions, the main place was occupied by mechanical jaundice, which was observed in 79 patients (44.4%), of which 51 had a total bilirubin content in blood serum exceeding 60 mmol/L.

Concomitant pathology was detected in all 171 patients. 135 of them had a combination of 2-3 or more systemic diseases. On average, there were 2.1 concomitant diseases per patient, while in the first age group (60-74 years) - 1.7, and in the second (over 75 years) - 2.4.

Diagnosis was carried out on the basis of the clinical picture of the gastrointestinal tract, laboratory and instrumental research methods (sonography, RHG, MR-cholangiography).

In accordance with the purpose and objectives of the study, the patients were divided into 2 study groups. The comparison group consisted of 74 (43.3%) patients who were operated on for acute cholecystitis and bile duct lesions for emergency and urgent indications in the period 2015-2018. The main group of the study consisted of 97 (56.7%), in which the algorithm for conducting therapeutic and diagnostic measures according to indications was based on the principles of priority use of surgical treatment methods with the use of minimally invasive surgical interventions. In the study, both groups of patients were identical both in age and in the severity of clinical manifestations and severity of the disease.

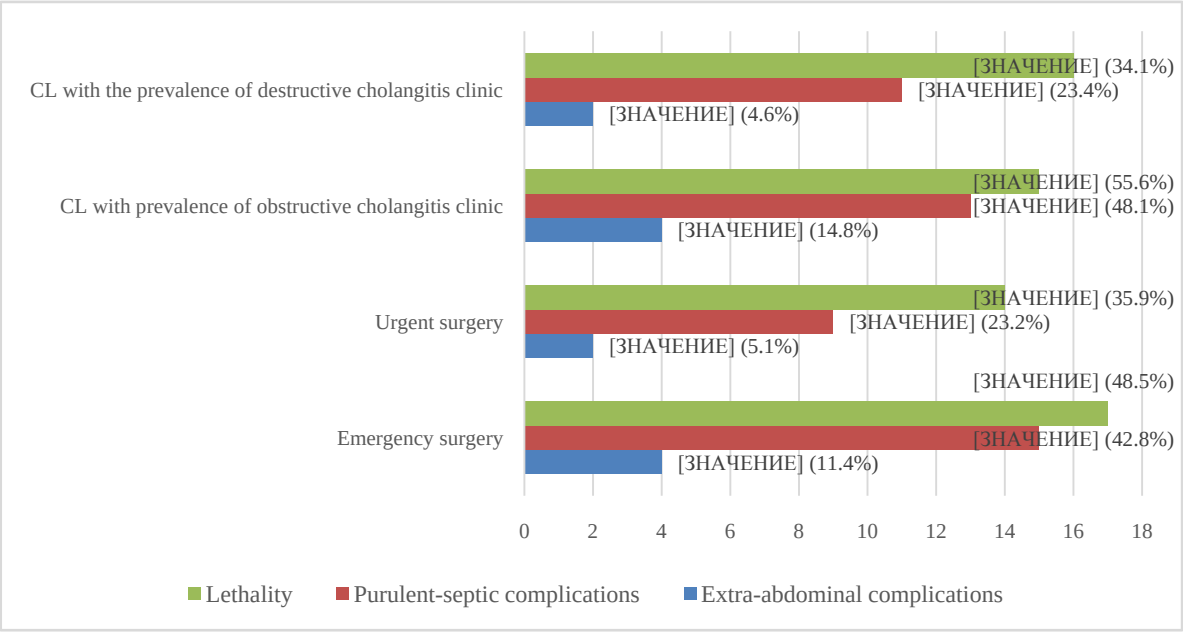

Figure 1. The frequency of mortality and postoperative complications depending on the urgency of operations and complicated CL clinic in the comparison group in elderly and senile patients

Table 1. Surgical interventions in elderly and senile patients with a severe degree of the condition and a predicted high risk of postoperative complications (n=64)

Clinic signs of the disease	Type of surgery		Number of patients	
CL with prevalence of acute destructive cholecystitis clinic (n=39)	PCTCE →	LCE	6	17
	PCTCE →	MLCE	2	
	PCTCE + puncture of biloma →	MLCE	6	
	PCTCE only		3	
	MLCE		14	22
	MLCE, autopsy of a perivesical abscess		3	
	Laparotomy, CE and sanitation of the abdominal cavity		5	
GI with prevalence of obstructive cholangitis clinic (n=25)	EPS and NBD →	LCE	4	20
	EPS and NBD →	MLCE	7	
	EPS only		5	
	EPS and PCTCE →	MLCE	2	
	only EPS and PCTCE		2	
	MLCE и choledocholithotomy (if EPS unsuccessful)		5	5

Table 2. Surgical interventions in elderly and senile patients with moderate severity of the condition and a predicted low risk of postoperative complications (n=33)

Clinic signs of the disease	Type of surgery		Number of patients	
CL with prevalence of acute destructive cholecystitis clinic (n=19)	PCTCE →	LCE	2	4
	PCTCE→	MLCE	2	
	LCE		7	15
	MLCE		8	
CL with prevalence of obstructive cholangitis clinic (n=14)	MLCE and choledocholithotomy		14	14

Of all 74 patients in the control group, 47 (63.5%) had a clinic of acute destructive cholecystitis, and 27 (36.5%) had a clinic of mechanical jaundice and cholangitis due to choledocholithiasis and BDS stenosis. In this group, surgical intervention consisted of performing HE (in 47 patients), or HE with choledocholithotomy (in 27 patients) with external drainage of the choledochus, and surgical intervention was performed from a wide laparotomy access in 33, from a mini–laparotomy access - 41.

Factor analysis revealed that the highest percentage of mortality, purulent-septic and extra-abdominal complications (14.8%, 48.1% and 55.6%, respectively) in elderly and senile patients were observed after attempts of simultaneous radical surgical correction of acute destructive cholecystitis or obstructive cholangitis (Fig.1). The cause of mortality was equally biliary and abdominal sepsis, as well as cardiovascular and pulmonary complications.

In the main group of 97 elderly and senile patients operated in 2019-2022 for complicated forms of CL, treatment was carried out not only taking into account the severity of acute cholecystitis and cholangitis according to the classification adopted in Tokyo 2018 (Tokyo Guidelines, 2018, TG18), but also according to the criteria developed by us for predicting the risk of postoperative complications.

According to these criteria, 42 (43.3%) patients were assigned to the group with an average severity of the condition and a relatively low predicted risk of postoperative complications. 55 (56.7%) patients of this cohort were assigned to the group with a severe clinical course of the disease and a predicted high risk of postoperative complications. The patients were operated taking into account the proposed criteria for the severity of the condition as well as the clinic of the complicated course of CL. (Table 1,2).

With the prevalence of acute destructive cholecystitis in the main group of 58 patients, 39 were assigned to the group with a severe clinical course of the disease and a predicted high risk of postoperative complications. Biliary peritonitis was detected in 11 of them (spilled in 5, delimited in 6 in the form of a formed biloma).

Due to the severity of the condition, 17 patients underwent stage 1 of percutaneous transhepatic cholecystostomy (PCTCE), 6 of them also had dotted and sanitized bilomas delimited in the subhepatic space. Cholecystectomy was performed on 14 patients on the 2nd stage of treatment on the 10th-14th day, из них LC–6, CE from minilaparotomic access -8. 3 patients were discharged without CE with a functioning cholecystostoma. 22 patients were operated on in one stage. 17 patients with acute destructive cholecystitis underwent MLC, of which 3 due to the melting of the wall of

a gangrenously altered gallbladder (in fact, an autopsy of a perivesical abscess was performed). 5 patients with the clinic of diffuse biliary peritonitis underwent CE with the rehabilitation of the abdominal cavity from a wide laparotomy access.

19 patients with a clinic of acute destructive cholecystitis with moderate severity of the condition and a predicted relatively low risk of postoperative complications 15 underwent cholecystectomy (7-LCE, 8-CE from the mini-access). Two-stage treatment with preliminary cholecystostomy (PCTCE) was performed in 4 patients, and 2 with puncture rehabilitation of delimited perivesical biloma. These 2 patients subsequently underwent CE from a mini-access. 2 more patients underwent LCE after microcholecystostomy.

In the group of patients with the prevalence of the clinic of mechanical jaundice and obstructive cholangitis (n=39) with a severe clinical course of the disease and a predicted high risk of postoperative complications, 25 patients were assigned. Due to the severity of the condition, 16 (64%) patients with stage 1 treatment successfully underwent endoscopic papillosphincterotomy (EPS) followed by nasobiliary drainage (NBD). In 5 (20%) patients, attempts at EPS and NBD installation were unsuccessful. These 5 patients with a progressive clinic of mechanical jaundice and cholangitis underwent CE and choledocholithotomy from a minilaparotomy access in the right hypochondrium. Of the 16 patients who successfully underwent EPS stage 2 after the improvement of the condition and relief of cholangiogenic intoxication clinic, 11 had CE, 4 of them had LCE, 7 patients had CE from minilaparotomic access. 5 patients after successful EPST refrained from radical surgery and they were also discharged from the hospital.

In combination with the clinic of obstructive cholangitis and acute cholecystitis, 4 patients underwent minimally invasive decompressive transduodenal interventions – EPS with lithoextraction. These patients also underwent PCTCE. In the future, 2 of them were carried out MLCE. 2 were discharged from the hospital with a significant improvement in their condition.

14 patients with moderate severity of the condition underwent simultaneous surgical interventions in the volume of CE and choledocholithotomy with external drainage of the choledochus from a mini-access in the right hypochondrium.

Thus, two-stage surgical treatment was performed in 27 (42.2%) patients with severe severity of the condition and a high risk of postoperative complications. 10 (15.6%) patients were limited to minimally invasive decompression intervention on the biliary tract. One-stage radical surgery was performed in 27 (42.2%) patients, and in 13 (20.3%) involuntarily in the presence of a clinic of peritonitis (5 patients) or perivesical abscess (3 patients) or with the failure of EPS.

Two-stage surgical interventions in patients with moderate severity of the condition and a predicted low risk of postoperative complications (n=33) were performed in 4 (12.1%) patients, one-stage radical surgery was performed in 29 (87.9%) patients.

4. Results and Discussion

PCTCE in the surgical treatment of patients with acute cholecystitis, 25 (25.8%) patients of the main study group were treated. Drainage of the gallbladder under ultrasound control was carried out through a section of the liver parenchyma in order to seal the channel and prevent leakage of bile into the abdominal cavity. Drainage in all cases was carried out with an "umbrella" stiletto catheter with a "basket" at the end, with a catheter diameter of 4F and 9F (Fig.2).

Figure 2. Percutaneous transhepatic microcholecystostomy under the control of ultrasound scanning

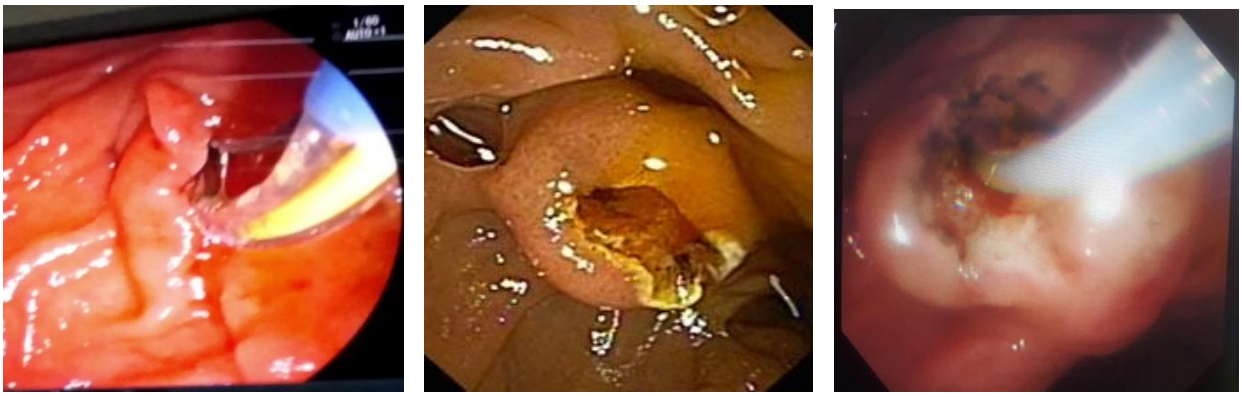

Figure 3. Endoscopic papillosphincterotomy and nasobiliary drainage

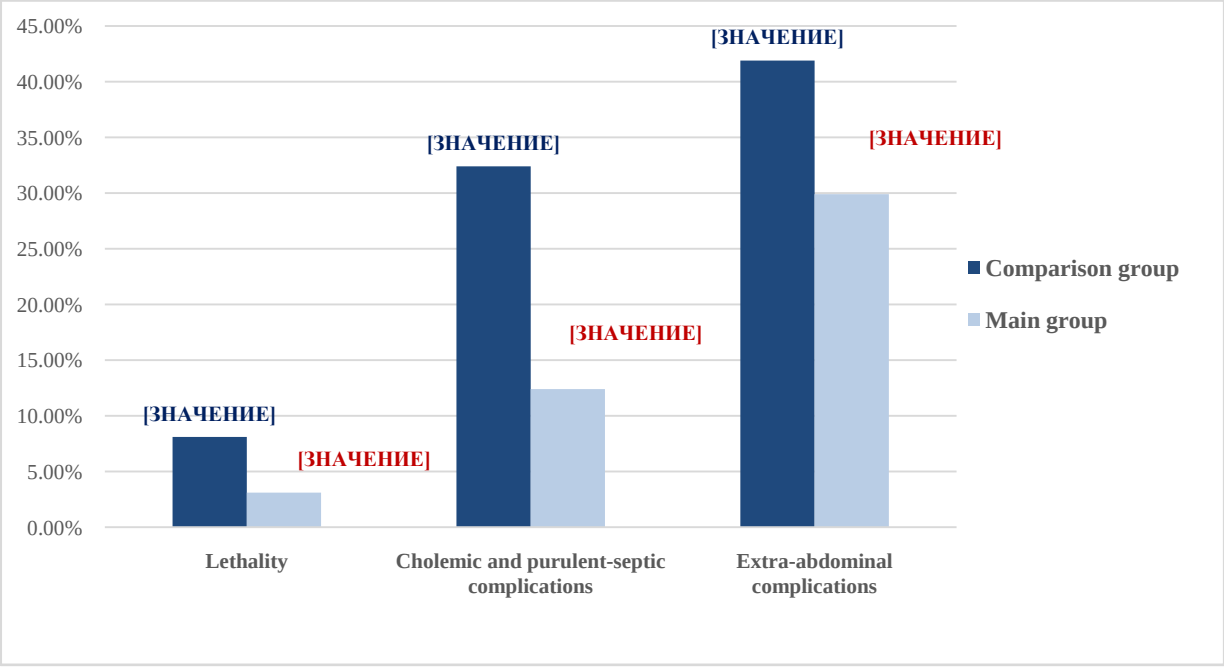

Figure 4. Results of surgical treatment of elderly and senile patients with complicated forms of CL in comparison groups

In the group of elderly and senile patients with the prevalence of acute obstructive cholangitis clinic, endoscopic papillosphincterotomy was performed in only 20 (20.6%) patients. EPS was performed in the endoscopic operating clinic using a duodenoscope, an electrosurgical unit and a sphincterotome. At the same time, it should be noted that in 5 patients, attempts at EPS and NBD installations were unsuccessful, in one case, the patient developed acute pancreatitis with a fatal outcome, in 1 more observation duodenal bleeding, which was cured conservatively (Fig.3).

Thereby, 2-stage surgical treatment was performed in 31 patients of the main group, which amounted to 31.9%. After preliminary minimally invasive decompression of the biliary tract, CE was performed in these patients by the second stage on days 7-14, with 12 –LCE, 19 – MLCE.

61 (62.9%) patients of the main study group underwent one–stage radical surgery - cholecystectomy from both wide laparotomy access in 5 patients with complications of peritonitis, 49 from minilaparotomy access (and in combination with choledocholithotomy in 19 patients), LCE was performed in 7 patients.

In total, only 19 (19.6%) patients underwent LCE, 63 (64.9%) patients underwent CE from mini-access, and 5 (5.1%) patients underwent wide laparotomy access. It should be noted that 10 patients due to the severity of the condition CE was not performed.

LCE was carried out using tools from the Karl Storz company, CE from the mini-access with tools from the SAN company.

A comparative analysis of the treatment results in the study groups showed a decrease in mortality and postoperative complications in the main study group of patients (Fig.4).

The most threatening complications in the control study group of patients were cholangiogenic liver abscesses and biliary sepsis, which caused deaths in 2 patients. Continuing peritonitis in 1 more observation also led to an unfavorable outcome. At the same time, in 3 patients, the cause of death was complications from the existing competing comorbid

pathology. In 2 cases, acute myocardial infarction was found to be the cause of death. In 1 observation – pulmonary embolism on the background of postoperative pneumonia. Thus, the mortality rate in the control group of patients (n=74) was 8.1% - 6 patients died. Of these, abdominal complications were the cause of death in 3 of them – biliary sepsis in 2, abdominal sepsis in 3, the fatal outcome was due to cardiovascular and pulmonary complications from the existing comorbid pathology.

At the same time, 3 out of 97 operated patients died in the main group, the mortality rate was 3.1%. The cause of the unfavorable outcome was acute pancreatitis as a complication of transduodenal endoscopic intervention in 1 patient and ongoing peritonitis in 1 observation. In another 1 observation, the cause of death was acute cardiovascular insufficiency due to myocardial infarction.

Various cholemic and purulent – septic complications were observed in 24 patients of the comparison group, which was 32.4%. At the same time, 3 (4.1%) had bilomas in the subhepatic region, which were drained by recanalization of contrapertures. 5 (6.7%) patients had bile discharge from drainage tubes installed in the subhepatic space, 5 (6.7%) patients underwent repeated operations to open and drain subhepatic and/or subdiaphragmatic abscesses, 2 (2.7%) underwent relaparotomy due to biliary peritonitis. Also, 4 (5.4%) patients were re-operated for cholemic intra-abdominal bleeding. Suppuration of the postoperative wound was observed in 12 (16.2%) patients.

In the main study group, postoperative complications developed in 12 patients, which was 12.4%. At the same time, bilomas of the subhepatic region were formed in 3 (3.1%) patients who were successfully sanitized by punctures under ultrasound control.

Cholemic bleeding from the liver from the area of transhepatic puncture of the gallbladder was observed in 3 (3.1%) patients. External bile discharge was observed in 3 patients, during relaparoscopy in 1 case, the failure of the stump of the cystic duct was revealed, which was repeatedly clipped, and in 2 more observations, coagulation of the gallbladder bed as a source of bile discharge into the abdominal cavity was performed.

Duodenal bleeding was noted in 1 patient after EPS, bleeding was stopped by conservative hemostatic therapy. In 2 patients, a subdiaphragmatic abscess was formed, sanitized by repeated punctures under the control of ultrasound. Suppuration of the postoperative wound was observed in 4 (4.1%) patients.

5. Conclusions

1. Factor analysis revealed that the highest percentage of mortality, purulent-septic and extra-abdominal complications (14.8%, 48.1% and 55.6%, respectively) in elderly and senile patients were observed after attempts of simultaneous radical surgical correction of acute destructive cholecystitis or obstructive cholangitis. The cause of mortality was equally biliary and abdominal sepsis, as well as cardiovascular and pulmonary complications.
2. Stage-by-stage surgical treatment, taking into account the developed criteria for assessing the severity of the condition of patients and the predicted risk of postoperative complications with the use of preliminary minimally invasive decompression interventions on the biliary tract performed in 42.2% of patients of the main group, allowed to stop purulent-cholemic intoxication, improve the results of subsequent radical operations. In 15.6% of patients, these interventions were the final method of treatment.
3. The developed therapeutic and diagnostic algorithm of staged surgical treatment, depending on the prevalence of destructive cholecystitis or obstructive cholangitis clinic using PCTCE under ultrasound guidance, EPS or a combination of them, made it possible to perform cholecystectomy laparoscopically at the subsequent stage of treatment in 19.6% and from the mini-laparotomy access - 64.9%.
4. Optimization of the tactical and technical aspects of surgical treatment of elderly and senile patients with complicated forms of GI, taking into account the severity of the patients' condition and the predicted risk of postoperative complications with priority staged use of minimally invasive interventions, significantly reduced mortality, postoperative purulent-septic and extra-abdominal complications (3.1%, 12.4% and 29.9%, respectively), while as in the comparison group, these indicators were 8.1%, 32.4% and 41.9%.

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