European Journal of Molecular & Clinical Medicine
ISSN 2515-8260 Volume 7, Issue 08, 2020

Surgical Treatment Of Acute Calculous Cholecystitis In Patients With Type 2 Diabetes Mellitus

O.R.Teshaev[1], R.M.Madaminov[2], B.T.Gafurov[3], N.Sh.Khudoyberganova[4], M.U.Ismoilov[5]

*1*MD, Professor, Head of the Department of Surgical Diseases, GP Faculty, Tashkent Medical Academy, Tashkent, Uzbekistan.

*2*MD, PhD, Department of Surgical Diseases, GP Faculty, Tashkent Medical Academy, Tashkent, Uzbekistan.

*3*MD, Teaching Assistant, Department of Surgical Diseases, GP Faculty, Tashkent Medical Academy, Tashkent, Uzbekistan.

*4,5*MD, PhD, Department of Surgical Diseases, GP Faculty, Tashkent Medical Academy, Tashkent, Uzbekistan.

ABSTRACT

Research objective: To conduct a comparative analysis of surgical intervention methods in patients with acute calculouscholecystitis associated with type 2 diabetes mellitus and determine the operation of choice.

Materials and methods. The researchinvolved 423 patients with acute calculouscholecystitis aged from 18 to 95 who underwent surgical treatment in the Surgical Department of the City Clinical Hospital No.1 in Tashkent in the period from 2015 to 2019. 195 (46.1%) patients had type 2 diabetes mellitus (25.5%). There were 142 (33.8%) men and 281 (66.2%) women. Laboratory diagnostics included clinical blood analysis, biochemical blood test, determination of glucose, bilirubin, creatinine, blood amylase, ALT, AST, ALP, coagulogram, as well as determination of the blood group and Rh factor.Instrumental diagnostics included ultrasound examination in combination with Doppler. When distributing patients according to the disease severity, the classification of the Tokyo Agreement on acute cholecystitis was applied (Tokyo guidelines (2007, 2013).

Results and discussion. Surgical intervention for acute calculouscholecystitis in patients with type 2 diabetes mellitus in 195 patientsincludedLCE for 104 (53.3%) patients, oblique muscle-splitting mini approach in the right hypochondrium for 91 (46.7%) patients, and open conversion for 4 (3,8 %) patients. The use of the laparoscopic method in the treatment of acute calculouscholecystitis in patients with type 2 diabetes mellitus provided a statistically significant reduction in surgery timing and the degree of intraoperative blood loss. In addition, it also reduced the number of postoperative complications almost two times compared with the open method.

Conclusion. The comparative analysis of the treatment outcomes showed that the application of LCE in diabetic patients has a number of advantages over the open method. Laparoscopic cholecystectomy in patients with acute calculouscholecystitis associated with type 2 diabetes mellitus is the operation of choice.

Key words: acute cholecystitis, diabetes mellitus, laparoscopic cholecystectomy, postoperative complications.

INTRODUCTION

The relevance of this paper is conditionedby the increasingincidenceof acute calculouscholecystitis associated with diabetes mellitus and obesity ingerontological patients, as well as unsatisfactory results of surgical treatment in this category. According to the literature data, acute calculouscholecystitis is two and three times more common in patients with diabetes mellitus than in those without[1,2]. The risk factors for the development of cholecystitis in patients with type 2diabetes mellitusinclude age, high body mass index and hereditary history of the disease [2,3]. Recently, a video laparoscopic method has been becomethe "gold standard". To date, up to 80% of surgeries for the removal of gallstones are performed laparoscopically [4,5].One of the indications for endovideosurgical removal of the gallbladder is cholecystitisassociated with diabetes mellitus, as the small size of trocars reduces the risk of developing purulent wound complications, developingin cases of open cholecystectomy in diabetic patients [6].

However, there are only few researcheswhich analyze the outcomes of laparoscopic cholecystectomy in patients with diabetes mellitus and assess the operational risk due to the increased level of concomitant diseases from the cardiovascular and respiratory systems in this contingent of patients [7,8]. According to the view of A.Bedirli et al. (2001), laparoscopic cholecystectomy in patients with diabetes mellitus is associated with a high level of complications and an increase in the threshold to open approach.Therefore, this type of operation in such patients should be performed after a thorough examination by an experienced surgeon [7]. Age, obesity and other pathological conditions of diabetic patients significantly influence on the outcome of the surgical treatment and should be taken into consideration when comparing the results of laparoscopic and open cholecystectomy. Thus, it can be concluded that the acute calculouscholecystitisassociated with diabetes mellitus has a more severe course, often leading to the development of complications. However, there is no consensus on the timing of surgical intervention in gerontological patients. In this work, by studying claudication (Doppler ultrasound) in patients with acute cholecystitisassociated with diabetes mellitus and obesity, an attempt to substantiate the need for early surgery was carried out.

Epidemiology of acute calculouscholecystitis, diabetes mellitus and their combinations. According to the WHOdata for 2007, a quarter of the population over 60 and a third of the population over 70 suffer from gallstones. Acute cholecystitis in the elderly and senile patients is the main problem of geriatrics and gerontology, due to the high frequency of gallstone disease among people of this age group.At the same time, interest to this problem is caused by the frequency of its complications as well,which are observed from 53 to 100%, in turn leading to high mortality rates [13, 14]. The risk factors for gallstone diseasedevelopment in men are older age, increase in body mass index and concomitant diseases: diabetes mellitus, liver cirrhosis, peptic ulcer,cardiac disease, as well as low levels of high density lipoproteins (HDL) and total cholesterol with triglycerides levelincrease. For womenrisk factorsin a greater degreeinclude age and body mass index [12].

The rate of surgical interventions in acute cholecystitis increases with each decade of life, reaching the peakin the period from 60 to 69 years, when 1/3 of patients admitted to the hospital undergo surgical interventions. [16; 20]. The increase in the number of elderly and senile patients with cholecystitis is noted by foreign authors [22, 23].

At the same time, in the last 30 years, a sharp increase in the diabetes mellitusincidence is observed, especially in industrialized countries, where its prevalence makes 5-6% and tends to further increase, primarily in age groups over 40 [14]. Every 10-15 years the number of patients with diabetes mellitus doubles. This is mainly conditioned by the increase of type 2 diabetes mellitus incidence, which, according to the American researcher C.R. Kahn (1995), makes about 6-7% of the total population [19].Calculations show that if the average life expectancy increases to 80 years, the number of patients with type 2 diabetes will exceed 17% of the population [9]. With the prolongingof the patientlife expectancy with diabetes, the need for surgical interventions increases.

According to the literature, almost every second patient with diabetes mellitus undergoes surgery at least once in his life. In patients with cholecystitis, diabetes mellitus is observed in 5-17% of cases [25]. Impairment of metabolic processes, decrease of resistance to infection in diabetes mellitus are the causesto the fact that acute calculouscholecystitisdevelops more often in patients with diabetes. Characterizing the epidemiological situation of obesity, it can be said that in economically developed countries, including Uzbekistan, on average, every third inhabitant has a body weight exceeding the maximum permitted (19).

The World Health Organization declared obesity an epidemic of the XXIst century. According to the predictions of epidemiologists, it is expected that by 2025, 40% of men and 50% of women will suffer from obesity. The number of people having overweight is progressively increasing. The rate is 10% of their previous number for every 10 years. It is estimated that if this trend continues, then by the middle of the next century, the entire population of economically developed countries will suffer from obesity [19].In recent years, obesity has been considered to be a chronic disease with frequent relapses that required lifelong treatment and consistent medical supervision. The main aim of the treatment is not only reduction of the body weight, but also prevention of the diseases associated with obesity. It is established that with a decrease in body weight by 5-10% of the initial frequency, the development of diabetes mellitus decreases by 50%, cardiovascular diseases by 9% (with 20% decrease in blood pressure) [19]. As a rule, people over 45are more likely have type 2 diabetes mellitus.The highest incidence of type 2 diabetes mellitus is observed in people withobesity. Thus, in people with moderate obesity, the incidence of diabetes increases by 4 times, and in people with severe obesity - 30 times [74]. Currently, the link between metabolic syndrome and diabetes mellitus with the development of cholecystitisis established by most clinicians [19,21].

RESEARCH OBJECTIVE

To conduct a comparative analysis of laparoscopic cholecystectomy in patients with acute calculouscholecystitisassociated with type 2 diabetes mellitus and determine the operation of choice.

MATERIALS AND METHODS

423 patients with acute calculouscholecystitis aged from 18 to 95 underwent surgical interventions in the Surgical Department of the City Clinical Hospital No.1 in Tashkentin the period from 2015 to 2019. Among them, 195 (46.1%) patients hadtype 2 diabetes mellitus (25.5%). There were 142 (33.8%) men and 281 (66.2%) women. It should be noted that in the group of patients with type 2 diabetes mellitus the ratio of men and women was 1:2, while among nondiabetic patients the ratio was 1:4 (106 or 19.8%, and 317 or 80.2% of patients, respectively).

As a rule, patients with type 2 diabetes mellitus had a less aggressive disease course; the disease developedafter 40 years old;carbohydrate metabolism disorderswere compensated by diet and oral use of antidiabetic drugs, or insulin administration. In cases when it was difficult to accurately differentiate the type of diabetes mellitus, patients were included in the second type group. All patients underwent obligatory consultation of an endocrinologist in order to identify the type of diabetes mellitus and work out a plan for corrective treatment in the pre- and postoperative period.

Most of the patients with acute calculouscholecystitisassociated with type 2 diabetes mellitus had a concomitant pathology, particularly, ischemic heart disease, hypertension, and chronic obstructive lung disease. The diagnosis of chronic ischemic heart disease was based on history and physical examination, taking into considerationthe previous hospital-confirmed myocardial infarction or acute coronary syndrome, using of coronary lytic drugs, the presence of clinical signs of effort or rest angina pectoris, and heart failure.

In patients with chronic obstructive lung disease, the history of indications of bronchial asthma attacks or chronic bronchitis and the use of special medications for the treatment were taken into consideration.

The diagnosis of hypertension was based on blood pressure monitoring indicators and anamnestic indications for taking antihypertensive drugs.

One of the risk factors in performingsurgical interventionwas the obesity in 22 patients. It should be noted that 18% of patients with diabetes mellitus had a combination of two or three or more concomitant diseases, which created additional difficulties in their diagnosis and treatment.

Diagnostic verification in all 195 patients with acute calculouscholecystitis was based on clinical, laboratory and instrumental data.

Local signs of cholecystitis.

Pain was noted in 72-93% of patients. Then nausea and vomiting followed in frequency. Muscular defense occurred in half of the cases, palpable gallbladder and positive rebound sensitivity were less common. Murphy's sign had a sensitivity of up to 65%.

Systemic signs of inflammation in acute calculouscholecystitis: fever, increased C-reactive protein level, leukocytosis, in combination with the ultrasound picture, had sensitivity (up to 97%), specificity (76%) and a positive predictive value of 95% - should be used in the process of diagnosis. Patients of the older age group and/or patients with diabetes mellitus had a subclinical case of the disease, the absence of signs of a systemic inflammatory response, and slight pain during deep palpation in the presence of destructive changes in the gallbladder walls. [16, 20, 18].

Laboratory diagnostics

Laboratory diagnostics included clinical blood analysis, biochemical blood test, determination of glucose, bilirubin, creatinine, blood amylase, ALT, AST, ALP, coagulogram, as well as determination of the blood group and Rh factor.

Instrumental diagnostics

Ultrasound diagnosis of acute calculouscholecystitis can be established in case of:

-increase in longitudinal (> 8 cm) or lateral (> 4 cm) dimensions;

- wall thickening more than 3 mm with signs of edema and echo structure disorders (layering and heterogeneity, "double contour"),

-blocking calculi in the gallbladderneck,

-perivesical fluid accumulation.

It should be noted that none of these signs has sufficient informational content for making a diagnosis.Therefore, when performing the ultrasound scan, it is necessary to consider their presence in the complex. Thickening of the gallbladder wall can occur not only in cases of acute cholecystitis, but also in liver diseases, heart and renal failure, as well as in case of hypoproteinemia and other diseases that do not require urgent surgical intervention.

Ultrasound in combination with Doppler in 95% of cases made it possible to differentiate acute obstructive (catarrhal) and acute destructive cholecystitis and to determine gangrenous cholecystitis based on the floating intraluminal membranes, foci of echogenic darkening in accordance with the presence of gas inside the wall or in the lumen of the GB and obvious impairments of GBW integrity and pericholecystic abscess. Dynamic ultrasound was especially informative.

In doubtful cases, in 18 patients, MRI of the abdominal organs allowed to differentiate acute calculouscholecystitis from other acute surgical diseases of the abdominal cavity. When distributing patients according to the disease severity, the classification of the Tokyo Agreement on acute cholecystitis was applied (Tokyo guidelines (2007, 2013).

Distribution of patients according to the severity of acute cholecystitis:

1. Mild course in 87 patients - acute cholecystitis in somatically healthy patients without concomitant diseases with moderate inflammatory changes in the gallbladderwall.
2. Moderately severe course in 65 patients - disease history more than 72 hours; palpable gallbladder or infiltrate in the right hypochondrium; leukocytosis more than $18x10^9/l$; verified destructive forms of acute cholecystitis with the development of pericholecysticcomplications or biliary peritonitis.
3. Severe course in 43 patients - acute cholecystitis, associated withmultisystem failure; arterial hypotension requiring drug correction; impaired consciousness; development of respiratory distress syndrome in adults, increased plasma creatinine levels, clotting disorders, thrombocytopenia (the high risk group).

The severity of the course and the degree of diabetes mellitus compensation in patients with acute calculouscholecystitisassociated with type 2 diabetes mellitus.

Distribution of patients according to the WHO classification and the severity of type 2 diabetes mellitus in patients with acute calculouscholecystitis (n-195).

Table 1

Mild (I degree) n-87	Cases of diabetes mellitus, in which the compensation of diabetes (normoglycemia and aglucosuria) is achieved only by diet. As a rule, this is type 2 diabetes mellitus - fasting glycemia up to 8 mmol/L, daily glucosuria up to 20 g/L. Angioneuropathy of functional stages can be diagnosed.
Moderate(II degree) n-65	Characterized by the compensation achievement for carbohydrate metabolism with insulin therapy up to 0.6 sd/kg per day or the use of oral antihyperglycemic agents- fasting glycemia up to 14 mmol/L, glucosuria up to 40 g/L;the cases of unexpressed ketosis, functional stages of angiopathy and neuropathy are possible.
Severe (III degree) n-43	Characterized by the presence of severe late complications - microangiopathy (proliferant retinopathy, nephropathy of stage II and III), neuropathy. It also includes cases of a labile course of diabetes (fluctuations in clycemia during the day by 5-6 mmol/d, which are partly associated with ketosis and ketoacidosis). Fasting glycemia 14 mmol/L, daily glucosuria more than 40 g/L. The daily insulin dose more than 0.7-08 U/kg

The degree of compensation of diabetes mellitus in patients with acute calculouscholecystitisassociated with type 2 diabetes mellitus.

Table 2

Compensation, n-87	Condition, in which normoglycemia and aglucosuria are achieved during the diabetes treatment.
Subcompensation, n-65	the course of diabetes, associated with moderate hyperglycemia (serum glucose 13.9 mmol/L, or 250mg/ 100 ml), glucosuria, not exceeding 50 g/day, absence of acetonuria.
Decompensation, n-43	the course of diabetes, when the content of glucose in the blood serum exceeds 13.9 mmol/L (more than 205 mg/100 ml), and in the urine - more than 50 g/day in the presence of varying degrees of acetonuria (ketosis).

RESULTS AND DISCUSSION

Currently diabetes mellitus is not a contraindication to surgical treatment.Effective insulin therapy regimens wereworked out to avoid intraoperative and postoperative complications. When establishing the surgery timing, an active individualized tactic was

followed. The operation was performed by the timewhen the diagnostic process was completed and the patient was ready, depending on the severity of his condition.When establishing indications for surgical intervention in patients with diabetes mellitus, a collegial approach was applied with the participation of a surgeon, endocrinologist, therapist and if necessaryinvolving a cardiologist, pulmonologist and other narrow specialists. All patients with acute calculouscholecystitisassociated with type 2 diabetes mellitus in the preoperative period, regardless of the method of surgery, were appointeda short-acting insulin split therapy. Oral hypoglycemic drugs were canceled for all patients.When carrying out insulin therapy, the patient management regimens were used as described in the "Algorithms for specialized care for patients with diabetes mellitus" dated 2009, edited by I. Dedov.

During the surgery, glycemiashould be kept within 4.47 mmol/L, with a maximum rise to 11 mmol/L, and the development of both hypo- and hyperglycemia must be minimized.

In the early postoperative period, the optimal glycemic values were 5.5-8.3 mmol/L. If the patient had not received insulin before, then the daily dose was calculated as 1 U/kg of body weight.

Management of patients with diabetes mellitus during emergency and urgent surgery:

- to cancel any antihyperglycemictherapy that the patient received prior to hospitalization;

- to ensure blood glucose control every hour during the operation, every 2 hours after the operation;to administrateActrapidaccording to the schemein case if blood glucose is more than 11 mmol/L.

At baseline decompensation (fasting glycemiamore than 10 mmol/L), perioperative glycemic control should preferably be carried out using continuous intravenous insulin infusion in the intensive care unit, according to the scheme described below.

Continuous intravenous insulin infusion was carried out using a separate infusion pump using a short-acting insulin solution with a concentration of 100 U in 100 ml of 0.9% NaCl.

In the postoperative period, the following principles of patient management were followed: patients with type 2 diabetes, previously compensated on the diet or oral drugs, were appointed back oral anti-hyperglycemic drugs and diet only in the absence of purulent-inflammatorycomplications and good wound healing (optimally, not earlier than suture removal). Insulinwithdrawal and appointment of oral antihyperglycemic drugswere carried out before the patient’sdischarge from the hospital after consultation with the endocrinologist.

Thus, patients with diabetes mellitus require appropriate care and treatment before, during and after surgery, which should be carried out in close cooperation between the anesthesiologist, surgeon and endocrinologist, aimed at reducing the risk of possible complications during the surgery.

There are data that in some cases, after surgical intervention for cholecystitis in the long-term period, 2-3 months after the surgery, the course of diabetes in patients becomes moderate; patients can reduce the dose of insulin and hypoglycemic drugs, and sometimes even it can be compensated only by diet therapy. This is due to the fact that in most cases, acute cholecystitis is a manifestation of long-term cholelithiasis, when the gallbladder, in fact, is a chronic inflammationsite, which contributes to a more severe course of diabetes [9].

Of 195 patients with diabetes mellitus, 104 underwent laparoscopic cholecystectomy, and concluded the main study group. Laparoscopic cholecystectomy. The occurrence of technical difficulties during LCE in 4 (3.8%) patients resulted in timely conversion and complication to open surgery before the development, includinginjury to the extrahepatic bile ducts.

According to the Table 3, 49 patients were operated within 12 hours from the moment of admission, who hadaprogressed inflammatory process, and signs of peritonitis. During the operation, destructive changes in the gallbladder walls were found, more pronounced changes, where the disease was combined with type 2 diabetes mellitus compared with the control group. The remaining 146 patients were operated within 12 - 24 hours from the moment of admission. Changes in the gallbladder walls in these patients, where chocecystitis was combined with diabetes mellitus, were more pronounced than in the control group. Thus, the data obtained indicate the need for early surgical interventions, where acute calculouscholecystitiswas combined with type 2 diabetes mellitus, after a short complex preoperative preparation.

Table 3: Distribution of patients by the timing of surgical intervention

Groups	**Operated within 12 hours,n-49**	**Operated within 24 hours,n-146**	**Total**
Group 1 (control)	16 (17,6%)	75 (82,4%)	91
Group 2 (type 2 diabetes mellitus and obesity)	15(41,7%)	21 (58,3%)	36
Group 3(type 2 diabetes mellitus)	18 (25%)	50 (73,5%)	68
Total	49 (25,2%)	146 (74,8%)	195

In 91 patients with acute calculouscholecystitis, cholecystectomy was performed using a minilaparotomic incision in the right hypochondrium, which allowed to successfully remove the destructivelychanged gallbladder.They were included in the control group of the study.

Table 4: Characteristics of operated patients with acute calculouscholecystitisassociated with type 2 diabetes mellitus

Main group (n = 104) Control group (n – 91, Abs.%)
Men 34 31.0 28 30.8> 0.05 Women 70 69.0 63 69.2> 0.05
Type 2 diabetes mellitus, mild (n-87): fasting glucose up to 8 mmol/L, daily glucosuria up to 20 g/L. Functional stages ofangioneuropathies can be diagnosed.
Type 2 diabetes mellitus,moderate (n-65): characterized by the possibility to achieve carbohydrate metabolism compensation using insulin therapy up to 0.6 sd/kg per day or using oral antihyperglycemic agent - fasting glycemia up to 14 mmol/L, glucosuria up to 40 g/L, unexpressed episodes of ketosis and functional stages of angiopathy and neuropathy can be revealed.
Diabetes mellitus,severe (n-43):the course of diabetes, when the glucose in the blood serum exceeds 13.9 mmol/L (more than 205 mg per 100 ml), and in the urine - more than 50 g/day in the presence of varying degrees of acetonuria (ketosis).
BMI <30 60 57.7 56 61.5> 0.05
BMI 30-40 38 36,5 33 36,3 >0,05
BMI > 40 6 5,8 2 2,2 <0,05

As can be seen from the presented table, in the group of patients who underwent open cholecystectomy, there was a statistically significant prevalence of patients with acute cholecystitis; while in the group of patients who underwent LCE, there was a prevalence of patients with morbid obesity (BMI> 40).Laparoscopic intervention was performed after the patient's informed consent, under endotracheal anesthesia using muscle relaxers.When performing laparoscopic cholecystectomy, standard points were used: 4 trocars: the first was inserted 1 cm below the navel, the second - 2-3 cm belowthe xiphoid process and slightly to the right of the median line, the third – 3-4 cm below the right costal arch along themidclavicular line, the fourth - at the level of the navel along the anterior axillary line.To extract the gallbladder, first, together with the trocar, the gallbladder neck was removed to the anterior abdominal wall, then the gallbladder was punctured, bile was aspirated, and the bladder was removed from the abdominal cavity. When the extraction of the gallbladder was difficult (the presence of multiple, large calculi), the skin and aponeurosis were dissected up to 2 cm, the canal was bluntly expanded with a finger and the gallbladder was pulled out.In patients with very large calculi (up to 5 cm), a micro-laparotomy was performed in the epigastric region. After removing the gallbladder and sealing the abdominal cavity, a thorough cleaning of the subhepatic, subphrenic space and the right lateral canal was performed by washing with an antiseptic solution;then the gallbladder bed was examined for final hemostasis and bile stasis.

In cases of pronounced adhesions between the liver and gallbladder, as well as a pronounced adhesive process in theCalot's triangle area, it can be very difficult to distinguish the anatomical structure.Such situations lead to significant difficulties in the successful completion of laparoscopic cholecystectomy.When attempting to isolate the cystic duct and artery by routine method and completely extract the gallbladder, there is a significant likelihood of difficult-to-control bleeding and injury to the bile ducts. In such cases, we applied non-standard options for endosurgical gallbladder dissection, in particular cholecystectomy from the bottom and laparoscopic subtotal cholecystectomy, the technique of which is discussed in a number of publications [11,12].

Drainage of the subhepatic space was carried out in 72 patients (69.2%) in the case of opening of the gallbladder lumen during the operation, as well as in all patients operated for acute cholecystitis. Comparative characteristics of the results of laparoscopic and open interventions on the gallbladder in patients with diabetes mellitus are shown in the Table 4.

Table 4: Outcomes of surgical treatment of patients with diabetes mellitus operated for acute cholecystitis

LCE	104
Oblique muscle-splitting mini approach in the right hypochondrium	91
Open conversion	4 (3,8 %)
Surgery timing (min M ± m)	56,4±2,6(83,6±3,2)
Degree of intraoperative hemorrhage(ml, M ± m)	54,3±3,8 (130,7±8,2)
Postoperative complications (n,% M ± m)	6 (5,8 ± 0,3 %) 10 (10,9 ± 0,5%)
Average bed-day (days M ± m)	5,6 ± 0,3 11,8±0,5 – P < 0,05

As can be seen from the Table 4, the surgery timingand the degree of intraoperative blood loss were statistically significantly less in the group of patients operated using endovideosurgical approach. The nature and number of complications during surgical intervention were one of the important criteria for the concept and quality of surgical treatment of patients with acute destructive cholecystitis.We did not observe severe intraoperative complications, such as injury to the extrahepatic bile ducts or large vessels of the hepatoduodenal ligament, regardless of the surgicalmethod. The cause of the conversion in all patients was a pronounced infiltrative adhesive process in the hepatoduodenal ligament.

Complications in the postoperative period in patients operated laparoscopically were observed in 6 (5.8%) cases, including subhepatic abscess - in 2 (2.5%) patients and wound suppuration - in 4 (3.8%) patients, with no extra-abdominal postoperative complications

observed. In the group of patients operated by the open method, complications were noted in 10 patients, including intra-abdominal abscesses - in 2 (2.2%), eventration - in 1 (1.1%), suppuration of the surgical wound - in 5 (5.5 %) of patients.

It should be noted that in this group we observed two severe extra abdominal complications in the form of massive thromboembolism of pulmonary artery in one patient and acute myocardial infarction with the development of severe heartbeat arrhythmia and acute cardiovascular failure in the second patient. Those complications led to death and developed in elderly patients with severe pathology. Postoperative mortality in the group of patients operated by the open method made 2.2%, while no mortalitywas noted among patients who underwent laparoscopic cholecystectomy.

CONCLUSION

The analysis showed that the use of the laparoscopic method in the treatment of acute calculouscholecystitis in patients with type 2 diabetes mellitus provided a statistically significant reduction in surgery timing and the degree of intraoperative blood loss.In addition,it also reduced the number of postoperative complications almost two times compared with the open method.Low invasiveness of endovideosurgical intervention, particularly insignificant injury to the abdominal wall and abdominal organs, contributes to more rapid activation and postoperative rehabilitation of patients. Besides, it prevents the development of severe, life-threatening conditions and reducesthe hospital stay period for two times. However,another controversial aspect of the laparoscopic cholecystectomy in patients with acute cholecystitis should be noted. The course of acute cholecystitisassociated with diabetes mellitus often turn into a peracute disease, accompanied by the rapid development of destructive changes in the gallbladderwalls, its perforation and the development of paravesical abscess or diffuse peritonitis [13, 14]. Therefore, some surgeons recommend performing a prophylactic laparoscopic cholecystectomy in patients with diabetes mellitus, even in the absence of clinical manifestations of cholelithiasis [15,16].We consider such a superradical approach unnecessary, as laparoscopic cholecystectomy, even performed in the absence of inflammatory changes in the gallbladder, is not devoid of intraoperative and postoperative complications, which, being associated with diabetes mellitus, can lead to severe consequences. Prevention of intraoperative complications consists in strict adherence to the recommendations on the surgery timing for acute cholecystitis, timely conversion to minilaparotomy or open surgery, as well as careful adherence to the rules for performing the operation.

When cholecystectomy is performed by an untrained surgeon, it is impossible to predict the risk of complications.

FINDINGS

1. Laparoscopic cholecystectomy in patients with acute calculouscholecystitisassociated withtype 2 diabetes mellitus is the operation of choice.
2. Comparative analysis of laparoscopic cholecystectomy efficacy in patients with acute calculouscholecystitis and type 2 diabetes mellitus showedthe statistically significant reduction in the surgery timing and the degree of intraoperative blood loss, as well as decrease in the number of postoperative complications almost two times, not accompanied by postoperative mortality compared to the open method.
3. Minilaparotomy with the use of a set of laporoscopy instruments is especially effective in the presence of contraindications to pneumoperitoneum, and ifthe surgeon does have

sufficient experience for LCE performing in cases of destructive forms of acute cholecystitis.

4. Minilaparotomic cholecystectomy can be used as a conversion method in case ofemersionof the technical difficulties during laparoscopic surgery.
5. All patients with acute calculouscholecystitisassociated with type 2 diabetes in the preoperative period, regardless of the method of surgery, were appointedshort-acting insulin split therapy.

REFERENCES

1. Balabolkin M.I., Klebanova E.M. The role of oxidative stress in the pathogenesis of vascular complications of diabetes // Problems of endocrinology. 2000. V. 46. No. 6. P. 29-34.

2.Baranov G.A., Reshetnikov E.A., Kharlamov B.V. Minimally invasive cholecystectomy in older patients with acute cholecystitis // Surgery.-2008.-№6.

3. Baulin I.B., Abashev V.N., Baulin A.N. Surgical tactics in acute cholecystitis // Surgery. - 1991. - No. 2. - P. 12-15.

4. Branko V.V., Bogdanova E.A., Kamshilina L.S., Makolkin V.I., Sidorov V.V. Method of laser Doppler flowmetry in cardiology. // A guide for doctors., M., 1999, P.48.

5. Briskin B.S., Bryunin A.B., Gudkov A.N. Comparative evaluation of minimally invasive operations for cholelithiasis and itscomplications. // Third Congress of the Association of Surgeons M. 2001; P. 67-68.

6. Briskin, B. S. Classification of microcirculation insufficiency based on the method of laser Doppler flowmetry / B. S. Briskin, V. N. Bukatko // Laser medicine of the XXI century. - M .: Triada, 2009 .-- P. 158.

7. Briskin B.S., Gudkov A.N., Lomidze O.V., Bryunin A.B. The choice of the method of surgery for acute destructive cholecystitis. // Materials of the interregional scientific-practical conference "Surgery of destructive cholecystitis". Yekaterinburg 2002; P. 19-20.

8.Vilyavin G.D., Isaev G.B. Surgical treatment of acute cholecystitis in patients with diabetes mellitus // Annals of Surgeon, - 1984, - No. 4.- P. 38-41

9. Dedov I.I., Shestakova M.V. Diabetes mellitus. M., 2003.

10. Ilchenko, A. A. Cholelithiasis / A. A. Ilchenko. - M .: Anacharsis, 2004 .—P.199.

11. Kuznetsov N.A., Ignatenko S.N., Brontwein A.T. et.al. Modern technologies for the treatment of acute cholecystitis. //Topical issues of practical medicine: Collection of scientific papers, M: RGMU 2000; P. 77-87.

12. Lomidze O.V., Gudkov A.N., AbidiM.Kh., Dmitrienko G.P. Modern approaches to the treatment of acute cholecystitis, combined with choledocholithiasis. // Materials of the scientific and practical conference dedicated to the 70th anniversary of the City Clinical Hospital No. 81 of the Moscow Department of Health, Moscow, 2007, p. 118-123.

13. PautkinYu.F. Klimov A.E. Biliary tract surgery. M. 2007. P. 366.

14. PantsyrevYu.M., Lagunchik B.P., Nozdrachev V.I., Zhevelyuk A.G. Laparoscopic microcholecystostomy in the treatment of acute cholecystitis. //Annals of Surgeon. 1990; 2: 30-34.

15. Galperin E.I., Semendyaev M.N., Neklyudova E.A. Hypohepatia. // - M .: Medicine, 1978.-: P.328.

16.Zatevakhin I.I., TsitsiashviliM.Sh., DzarasovaG.Zh. Acute cholecystitis: diagnosis and treatment.// RGMU Bulletin 2000; 3: 21-26s.

17. PantsyrevYu.M., Lagunchik B; P :, Nozdrachev V.I. Surgical treatment of acute cholecystitis complicated by peritonitis in elderly and senile patients.// Surgery 1990; 1: 6-10.

18.PantsyrevYu.M., Lagunchik B.P., Nozdrachev V.I., Zhevelyuk A.G. Laparoscopic microcholecystostomy in the treatment of acute cholecystitis. //Annals of Surgeon. 1990; 2: P. 30-34.

19. Chazova I.E., Mychka V.B. Metabolic syndrome, type 2 diabetes mellitus and arterial hypertension. // Heart: a journal for medical practitioners. 2003, V. 2, No. 3, P.102-144.

20. Cherepanin A.I., Gallyamov E.A., BiryukovA.Yu. et al. Cholecystectomy from low-traumatic approaches in the treatment of acute cholecystitis // Surgery, 2010.-N 12.-P.31-37.

21. Sherlock Sh., Dooley J. Diseases of the liver and biliary tract: a practical guide: trans. from English (Under the editorship of Z.G.Aprosina, N.A. Mukhin) // M. - Geotar medicine. - 1999 .—P.864.

22. Cameron I.C., Chadwick C., Phillips J., Johnson A.G. Current practice in the management of acute cholecystitis. Br J Surg 2000 Mar; 87: 3: 362-373.

23. MouretF. Laparoscopic cholecysectomy. Hospimedica. 1991; 9: 8: 30-34.

24. Chapman B., Wilson I., Frampton C. Prevalence of gallbladder disease in diabetes mellitus // Dig. Dis. Sci. 1996. V.41. P.2222-2228.

25. Pagliarulo M., Fornari F., Fraquelli M. Gallstone disease and related risk factors in a large cohort of diabetic patients // Dig. Liver. Dis. 2004. V.36. P.130-134.

26. Bell D., Allbright E. The multifaceted associations of hepatobiliary disease and diabetes // Endocrine Practice. 2007. V.13. P.300-312.

27. Carbonell A. Lincourt A., Kercher K. et al. Do patient or hospital demographics predict cholecystectomy outcomes? A nationwide study of 93,578 patients // Surg. Endosc. 2005. V.19. P.767.

28. Rosenmuller M., Haapamaki M., Nordin P. et al. Cholecystectomy in Sweden 2000-2003: a nationwide study on procedures, patient characteristics, and mortality // BMC Gastroenterol. 2007. V.17. P.35.

29. Fedorov I.V., Sigal E.I., Odintsov V.V. Endoscopic Surgery. // M.: GEOTAR-Medicine, 1998, - P. 351.

30. Bedirli A, Sozuer E., Yuksel O., Yilmaz Z. Laparoscopic cholecystectomy for symptomatic gallstones in diabetic patients // J. Laparoendosc. Adv. Surg. Tech. 2001. V.11. P.281-284.

31. Paajanen H., Suuronen S., Nordstrom P. et al. Laparoscopic versus open cholecystectomy in diabetic patients and postoperative outcome // Surg. Endosc. 2011. Mar. V.25. №3. P.764-770.

32. Ukhanov A.P., Chakhmachev S.R., Ignatiev A.I. Laparoscopic surgery of acute cholecystitis. V. Novgorod: NovGU Publishing House, P.2010.92.

33. Ukhanov A.P., Ignatiev A.I., Kovalev S.V.et al. Laparoscopic subtotal cholecystectomy in patients with acute destructive cholecystitis // Endoscopic surgery. 2011., No. 3,P.12-15.

34. Sandler R., Maule W., Baltus M. Factors associated with postoperative complications in diabetes after biliary tract surgery // Gastroenterology. 1986. V.91. P.157-162.

35. Shpitz B., Sigal A., Kaufman Z., Dinbar A. Acute cholecystitis in diabetic patients // Am. Surg. 1995. V.61. P.964-967.

36. Patin˜o J.F., Quintero G.A. Asymptomatic cholelithiasis revisited // World J. Surg. 1998. V.22. P.1119-1124.

37. Meshikhes A.W. Asymptomatic gallstones in the laparoscopic era // J. R. Coll. Surg. Edinb. 2002. V.47. P.742-748. Bibliography (Transliterated)