

Comparative Evaluation of the Results of Surgical Treatment of Postoperative Bile Leakage on the Background of Obesity in Urgent Surgery

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Abstract In the course of the study, the authors developed a treatment and diagnostic algorithm of actions in the prevention, timely diagnosis and treatment of this contingent, including some tactical and technical aspects, which, in general, made it possible to optimize surgical tactics. A comparative analysis of the results of surgical treatment of urgent surgical interventions in destructive forms of ACC against the background of obesity showed that over the subsequent similar period of time, the incidence and development of postoperative BL decreased from 43 (4.7%) to 29 (2.3%), the frequency of performing relaparotomies decreased from 30 (3.3%) to 10 (0.8%) and deaths from 8 (0.9%) to 0.1%.

Keywords Postoperative bile leakage (BL), Obesity, Cholelithiasis (GSD), Acute calculous cholecystitis (ACC), Relaparotomy, Relaparoscopy, Reoperations

1. Introduction

Acute calculous cholecystitis (ACC) is accompanied by high postoperative mortality - 0.9 to 14.6%, among which are predominantly obese people [1,3]. By the end of the 20th century, about 30% of the inhabitants of our planet had overweight, i.e. about 1.7 billion people [4]. It is alarming that there is an increase in obese people in our Republic [6]. Currently, the frequency of bile leakage in the structure of postoperative complications ranges from 0.53-6.3% [2]. Despite a large number of publications, there is no generally accepted treatment strategy, and the results of surgical treatment remain not always satisfactory [5]. Problematic issues remain regarding the effectiveness of the use of relaparotomy and relaparoscopy in postoperative BL against the background of obesity in emergency surgery. The present study is devoted to the solution of these questions.

The aim of the research. Improving the results of surgical treatment of postoperative bile leakage in urgent surgery by developing a treatment and diagnostic algorithm of actions.

2. Material and Methods

The work is based on the results of a retrospective and prospective analysis of the surgical treatment of postoperative BL in 72 patients with ACC for the period 2016–2023.

For a comparative assessment of the results of surgical treatment of the studied patients, two groups were conditionally distinguished:

- control group - (2016-2019) - 43 (59.7%) patients who underwent a retrospective analysis of the results of surgical treatment in compliance with traditional approaches;
- the main group - (2020-2023) - 29 (40.3%) patients who underwent a prospective study of surgical treatment using an optimized surgical approach.

The distribution of the studied patients, we carried out according to the WHO International Age Classification (2021).

3. Results and Their Discussion

In the control group, at the age of 19-44 years (young age), postoperative BL was found in 5 (11.7%) patients, at the age of 45-59 years (mature age) - in 26 (60.5%) and 60 years and older (old age) - in 12 (27.9%). At the same time, men made up 20 (46.5%), and women - 23 (53.5%). A retrospective analysis showed that this complication is most often observed in people of the most able-bodied age, which is of great economic importance. However, often (27.9%) postoperative BL was observed in people over 60 years of age, which is of great social importance for our society. It was also found that the ratio of the number of men to women was almost 1:1, although women suffer from gallstone disease 4-5 times more often. A retrospective

analysis of the results of surgical treatment showed that out of 922 patients operated on an emergency basis for acute calculous cholecystitis (ACC), for the period from 2016 to 2019 (4 years), postoperative bile leakage (BL) was noted in 43 (4.7%) cases. In addition, in the control group in patients with postoperative BL, obesity of the first degree was noted in 11 (25.6%), the second - in 24 (55.8%) and the third - in 8 (18.6%). The occurrence of postoperative BL on the background of obesity was noted during urgent surgical interventions for ACC, complicated by a simple form in 14 (32.6%) patients, phlegmonous - in 21 (48.8%) and gangrenous form - in 8 (18.6%) patients. At the same time, postoperative BL of grade I was observed in 17 (39.5%) patients, grade II - in 19 (44.2%), and grade III - in 7 (16.3%) patients. It should be noted that out of 922 cases in the control group, LCE was performed in 401 (43.5%) patients, mini-access CE in 142 (15.4%), and TCE in 379 (41.1%) patients.

In the control group after LCE, postoperative BL was observed in 14 (3.5%) patients, where relaparotomy was performed in 9 (2.2%) cases with a fatal outcome in 3 (0.7%) cases and relaparoscopy in 5 (1.2%) cases. After CE from the mini-access, postoperative BL was noted in 21 (14.8%) patients, where relaparotomy was performed in 15 (10.5%) cases with a fatal outcome in 3 (0.7%) cases and relaparoscopy in 6 (4.2%) cases. After TCE, postoperative BL was observed in 8 (2.1%) patients, where relaparotomy was performed in 6 (1.5%) with a fatal outcome in 2 (0.5%) cases and relaparoscopy in 2 (0.5%) patients.

In general, in the control group, postoperative GI was noted in 43 (4.7%) patients, where relaparotomy was performed in 30 (3.3%) with a fatal outcome in 9 (1.0%) and relaparoscopy in 13 (1.4%) of patients. Postoperative purulent-septic (wound) complications were noted in 34 (3.7%) patients, and general postoperative complications - in 63 (6.8%) with a fatal outcome in 6 (0.7%) cases.

A retrospective analysis of the results of urgent surgical interventions for destructive forms of ACC on the background of obesity was the basis for studying shortcomings and omissions, which was the basis for the development of a treatment and diagnostic algorithm for optimizing surgical tactics and developing measures to prevent the occurrence of postoperative BL, including an improved method of "submersible » invagination CDA method.

According to the proposed treatment and diagnostic algorithm for postoperative BL (biliary peritonitis) in patients after urgent surgical interventions for ACC on the background of obesity, along with the analysis of complaints, the collection of anamnesis with the establishment of the features of the primary operation (LCE, CE from a mini-access or "traditional" CE), repeated ECG, clinical and repeated laboratory studies (general blood and urine tests, biochemical analyzes) were carried out.

When diagnosing concomitant therapeutic pathologies, they were corrected in the Department of Surgery together with therapists, cardiologists, endocrinologists, and so on (depending on the nature of the pathology). In parallel, first

of all, ultrasound was carried out as the most accessible and non-invasive method of radiation diagnostics. Since our contingent consisted of patients with varying degrees of obesity, we used the formula for determining body mass index (BMI) according to Kelly (2022). When establishing obesity of the 1st degree (BMI 30-34), when conducting a study to clarify the diagnosis and determine the surgical tactics, Clexane therapy was started - 20 mg s / c before reoperation, 20 mg after reoperation, as well as cardiomagnyl therapy - 0.075 mg / day, 1 time starting from the first day of the postoperative period. With obesity of the 2nd degree (BMI 35-39), Clexane therapy was started - 40 mg s / c before reoperation, 60 mg in the first after reoperation, as well as cardiomagnyl therapy - 0.075 mg/day, starting from the third day after reoperation. With obesity of the 3rd degree (BMI 40), Clexane therapy was started - 40 mg s / c before reoperation, one hour after reoperation and on the 2nd-3rd day - 20 mg, 1 time per day. Therapy with cardiomagnyl - 0.075 mg/day was carried out from the 4th day after reoperation.

Relaparoscopy was used for diagnostic purposes, when the presence of delimited peritonitis was assumed in the unfavorable course of the postoperative period, and non-invasive diagnostic methods did not provide the expected information. The main advantage of laparoscopy was that the diagnostic stage in most patients was completed by a therapeutic laparoscopic aid. In the absence of free fluid in the abdominal cavity, the usual complex of postoperative procedures (symptomatic therapy) should be continued.

With ultrasound, the determination of traces of fluid or its presence is less than 100 ml, active monitoring is necessary in dynamics, with the continuation of conservative therapy. Protease inhibitors and antisecretory drugs should be added, and gastric aspiration should be performed using a permanent decompression tube.

A limited accumulation of free fluid in the subhepatic space of more than 100 ml and up to 500 ml allows one to suspect limited damage and limitation of the process. With the spread of free fluid throughout the abdominal cavity, exceeding the volume of more than 500 ml, it makes it possible to judge the occurrence of a life-threatening complication. This contingent, on an emergency basis (according to indications), should undergo CT or MSCT. To determine the nature and level of the defect and choose the appropriate treatment tactics, it is necessary to perform endoscopic retrograde cholangiography (ERCG). Intraoperative cholangiography (IOCG) through the stump of the cystic duct makes it possible to establish the cause of hypertension, but it is difficult to eliminate it laparoscopically, especially in such unfavorable conditions. It's easier and safer to do it in the "open" way.

Further tactics of laparoscopic intervention depends on the results of cholangiography and consists in clipping the cystic duct, draining it, or expanding the scope of the operation with a possible transition to laparotomy. After eliminating the cause of bile leakage, the abdominal cavity is washed, drains are installed in the subhepatic space and in places of potential accumulation of effusion.

All these procedures are carried out with active preoperative preparation for reoperation, together with an anesthesiologist-resuscitator, as well as relevant specialists (depending on the presence and nature of concomitant therapeutic pathology). Unfortunately, this research is not always possible. In this case, relaparoscopy as a diagnostic intervention is fully justified, which in certain clinical situations can be a method of reoperation.

Suspicion of postoperative BL, diagnosed by drainage discharge or due to complex clinical, laboratory and instrumental diagnostics, with signs of peritoneal irritation, is an indication for relaparoscopy.

The lack of effect of antispasmodic therapy within 1-2 days should be considered as an indication for relaparoscopy, even with a small (up to 100 ml), but stable volume of bile secretions.

The question of urgent relaparoscopy arises in cases where the volume of bile released through the drainage on the first day after surgery exceeds 100 ml, or ultrasound detects free fluid in the abdominal cavity. This may be due to damage to the main bile ducts, failure or defect in the stump of the cystic duct. In the first case, relaparoscopy is unpromising. This requires intervention by laparotomy access. Relaparoscopy should be preferred for BL from the cystic duct stump.

Re-intervention was performed within the period from 2 days to 7 days after the operation. Pathological changes detected during relaparoscopy in the next three days after surgery are usually manifestations of diffuse peritonitis with bile effusion, more or less widespread loose adhesions and fibrinous overlays. The unions delimiting bile during the first week remain friable, easily and bloodlessly exfoliate.

In case of incompetence of the cystic duct stump (SCD) or loss of drainage from the common bile duct, in this contingent it is optimal to perform relaparoscopy with clipping of the SC stump or re-installation of the drainage in the choledoch and its re-fixation. Against the background of obesity and the presence of concomitant pathology, relaparotomy can significantly worsen the outcomes of surgical treatment.

In case of bile leakage from the passages of Luschka, in the absence of the effect of conservative therapy, it is also optimal to perform reoperation as a reoperation - relaparoscopy, with suturing, clipping or coagulation.

Limited transection or occlusion of the non-major bile ducts (SCD) is also an indication for relaparoscopy with suturing or clipping on scaffold drainage.

With complete transection or occlusion of non-major SCDs or limited transection of the choledochus, an indication for relaparotomy in the "traditional" way, with suturing on a T-shaped drainage, followed by stenting, is indicated.

With complete intersection or occlusion of the common bile duct, relaparotomy with choledochoduodenostomy (CDA) or choledochojunoanastomosis (CEA) "end-to-side" "submerged" sutures according to our method, with nasogastro - or - juno-biliary drainage is indicated. In certain clinical situations, performing a reconstructive restorative operation (RRO) is indicated.

It should be noted that in all cases of reoperation, surgery should be completed with drainage of the abdominal cavity, according to generally accepted canons, incl. subhepatic space and Winslow's space according to the type of "flow system".

In this contingent, due to the high probability of developing thromboembolic complications (TEC), along with conventional therapy, as mentioned earlier, it is necessary to continue specific and nonspecific prophylaxis.

In recent years, we have begun to use a modified method of invagination end - lateral choledochoduodenostomy (CDA) with "submerged" sutures, which was used in 6 (13.8%) patients.

At the second stage, the development and implementation of a treatment and diagnostic algorithm was carried out, which allows to establish a differentiated approach to the choice of relaparotomy and relaparoscopy and optimize surgical tactics, as well as the use of a modified method of "submersible" invagination interintestinal anastomosis, as a measure for the prevention of suture failure from 2019 to 2023 (main group - 29 patients).

In the main group, at the age of 19-44 years (young age), postoperative BL was found in 4 (13.8%) patients, at the age of 45-59 years (mature age) - in 15 (51.7%) and 60 years and older (old age) - in 10 (34.5%). At the same time, men made up 13 (44.8%), and women - 16 (55.2%). A prospective study showed that this complication is most often observed in people of the most able-bodied age, which is of great economic importance. However, often (34.5%) postoperative bile leakage was also noted in people over 60 years of age, which is of great social importance for our society. It was also found that the ratio of men to women was almost 1:1, although women suffer from gallstone disease 4-5 times more often.

In the simple form of ACC, primary urgent surgical interventions were performed in 11 (37.9%) patients, where obesity of the first degree was diagnosed in 3 (10.3%), the second - in 7 (24.2%) and the third - in 1 (3.4%). In the phlegmonous form of ACC, primary urgent surgical interventions were performed in 12 (41.4%) patients, where obesity of the first degree was in 3 (10.3%), the second - in 7 (24.1%) and the third - in 3 (10.3%). In the gangrenous form of ACC - performed in 6 (20.7%) patients, where obesity of the first degree was in 2 (7.0%), the second - in 1 (3.4%) and the third - in 3 (10.3%).

In the main group, among the destructive forms, the most common was the phlegmonous form (41.4%), but in prognostic terms, the most severe contingent is with the gangrenous form (20.7%). It was also noted that most often urgent operations were performed in the second degree of obesity - 15 (51.7%), however, significant difficulties in determining the surgical tactics arose in the third degree of obesity - 6 (20.7%), which affected the outcomes of surgical treatment.

In the main group, I degree of postoperative BL was diagnosed in 16 (55.2%) patients, where obesity of the first degree was established in 6 (20.7%), the second - in 9 (31.0%) and the third - in 1 (3.4%). Grade II postoperative BL was

diagnosed in 10 (34.5%) patients, where obesity of the first degree was established in 2 (6.9%), the second - in 5 (17.2%) and the third - in 3 (10.3%). III degree of postoperative BL was diagnosed in 3 (10.3%) patients, where obesity of the second degree was established in 1 (3.4%) and the third - in 2 (6.9%). It is important to note that postoperative LII and II degree (55.2 and 34.5%, respectively). At the same time, the III degree of bile leakage (10.3%) was diagnosed much less, however, it is this contingent that may have a higher likelihood of developing life-threatening consequences. The situation is aggravated when this complication is combined with obesity of the second third degree, which was found in 3 (10.3%) and 2 (6.9%) patients.

In the main group with a simple form of ACC, primary surgical interventions were performed in 11 (37.9%) patients, where grade I postoperative BL was diagnosed in 7 (24.1%) and grade II in 4 (13.8%). In the phlegmonous form of ACC, primary surgical interventions were performed in 12 (41.4%) patients, where grade I postoperative GI was diagnosed in 8 (27.7%), grade II in 3 (10.3%), and grade III in 1 (3.4%). In the gangrenous form of ACC, primary surgical interventions were performed in 6 (20.7%) patients, where grade I postoperative BL was diagnosed in 1 (3.4%), grade II in 3 (10.4%), and grade III in 2 (6.9%).

A prospective analysis showed that postoperative BL of grade II was most often noted - 10 (34.5%), and primary surgical interventions were most often performed against the background of ACC complicated by a phlegmonous form - 12 (41.4%). However, the greatest threat in terms of outcomes was represented by patients with grade III obesity - 3 (10.3%), who underwent primary surgical interventions for ACC complicated by the phlegmonous form - 1 (3.4%) and ACC complicated by the gangrenous form - 2 (6.9%) patients.

We approached the preoperative preparation of ACC against the background of obesity on a purely individual basis. The program of comprehensive preoperative preparation as a whole was aimed at: drug treatment of diagnosed concomitant therapeutic diseases, correction of cardiopulmonary activity and water and electrolyte balance disorders, as well as prevention of thromboembolic and purulent-septic (wound) complications.

In the main group, the analysis of the results of surgical treatment showed that out of 1247 patients operated on an emergency basis for acute calculous cholecystitis (ACC), for the period from 2019 to 2023 (4 years), postoperative bile leakage (BL) was observed in 29 (2.3%) cases. In addition, in the main group in patients with postoperative GI, obesity of the first degree was noted in 8 (27.6%), the second - in 15 (51.7%) and the third - in 6 (20.7%). The occurrence of postoperative BL on the background of obesity was noted during urgent surgical interventions for ACC, complicated by a simple form in 11 (37.9%) patients, phlegmonous - in 12 (41.4%) and gangrenous form - in 6 (20.7%) patients. At the same time, postoperative BL of I degree was observed in 16 (55.2%) patients, II degree - in 10 (34.5%) and III degree - in 3 (10.3%) patients. It should be noted that in the main group

of 1247 cases, LCE was performed in 656 (52.6%) patients, mini-access CE in 158 (12.7%), and TCE in 433 (34.7%) patients.

In the main group after LCE, postoperative BL was noted in 16 (2.4%) patients, where relaparotomy was performed in 6 (0.9%) and relaparoscopy in 10 (1.5%). After CE from the mini-access, postoperative BL was observed in 5 (3.1%) patients, where relaparotomy was performed in 2 (1.2%) with a fatal outcome in 2 (0.6%) cases and relaparoscopy in 3 (1.9%) cases. After TCE, postoperative BL was noted in 8 (1.8%) patients, where relaparotomy was performed in 2 (0.4%) and relaparoscopy in 6 (1.3%) patients.

So, in general, in the main group, postoperative GI was noted in 29 (2.3%) patients, where relaparotomy was performed in 10 (0.8%) with a fatal outcome in 1 (0.1%) and relaparoscopy in 19 (1.5%) of patients. In the main group, postoperative purulent-septic (wound) complications were noted in 19 (1.5%) patients, and general postoperative complications - in 33 (2.6%) with a fatal outcome in 3 (0.2%) cases.

4. Conclusions

Thus, a comparative analysis of the results of surgical treatment of urgent surgical interventions in destructive forms of ACC against the background of obesity showed that over the subsequent similar period of time, the incidence and development of postoperative GI decreased from 43 (4.7%) to 29 (2.3%) - (2-fold decrease), the frequency of relaparotomies decreased from 30 (3.3%) to 10 (0.8%) - (4-fold decrease) and deaths from 8 (0.9%) to 0.1% - (decrease by 10 times). At the same time, the frequency of purulent-septic (wound) complications decreased from 34 (3.7%) to 19 (1.5%) - (2.5 times decrease), and general complications decreased from 63 (6.8%) to 33 (2.6%) - (2.6 times decrease) and the frequency of deaths - from 6 (0.7%) to 3 (0.2%) - (3.5 times decrease).

In the course of the study in patients with destructive forms of ACC on the background of obesity, the development of postoperative BL, we established the relationship between the degree of obesity, the nature of pathomorphological changes in the gallbladder, the method of surgical intervention on the nature and degree of postoperative BL, as well as its outcomes. As a result, we have developed a therapeutic and diagnostic algorithm for prevention, timely diagnosis and treatment of this contingent, including improving the method of "submersible" invagination CDA, which in general has made it possible to optimize surgical tactics and improve the results of surgical treatment of this category of patients.

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