

EFFICACY OF PERCUTANEOUS TRANSHEPATIC CHOLECYSTOSTOMY IN ACUTE OBSTRUCTIVE CHOLECYSTITIS

Ospan Zh.R.¹, Doskhanov M.O.^{1,2}, Serikuly E.², Mukazhanov D.Y.², Hadjieva A.A.¹, Tileuov S.T.², Skakbayev A.S.², Askeev B.T.², Baimakhanov Zh.B.^{1,2}, Kaniyev Sh.A.^{1,2}, Chormanov A.T.², Baimakhanov B.B.^{2,1}, Seisembayev M.A.²

¹“S.D.Asfendiyarov Kazakh National Medical University” NC JSC, Almaty, Kazakhstan

²“A.N. Syzganov National Scientific Center of Surgery” JSC, Almaty, Kazakhstan

Abstract

Acute obstructive cholecystitis is a common disease with a significant risk of mortality and complications. Active surgical tactics, such as open and laparoscopic access, pose a significant risk for elderly patients with concomitant diseases on the background of acute cholecystitis. The aim of our study is to analyze the effectiveness of percutaneous transhepatic cholecystostomy (PTCS) in acute obstructive cholecystitis (AOC) and subsequent laparoscopic cholecystectomy (LCE).

Materials and methods. Retrospectively, we analyzed 64 patients treated with AOC in the period from 2017 to 2021 at the NSCS named after A.N. Syzganov. We divided them into 2 groups depending on surgical treatment. The first group: patients who were performed PTCS (n=29) at the first stage. The second stage, LCE was performed during the waiting period from 3 days to 72 days. The second group: patients who underwent LCE without drainage of the gallbladder (n=35). Also, the patients of the first group were divided into 3 subgroups depending on the waiting time: group A - LCE was performed within 10 days after PTCS, subgroup B - LCE was performed after from 2 to 4 weeks (n=12), patients of the subgroup C, LCE were performed after 4 weeks after PTCS. Preoperative, intraoperative data and postoperative complications were analyzed.

Results. According to preoperative data, there was no significant difference in body temperature, laboratory data and concomitant diseases. The statistical difference was revealed only in the age of patients (65.3±9.0 vs 53.4±15.4). The duration of the operation in the second group of LCE was longer compared to the first group, but no significant difference was detected (108.1 ± 30.5 vs 117.9 ± 39.9). In the postoperative period after LCE, complications were observed in 5 (14.2%) cases: bleeding in 4 (11.4%) cases and suppuration of the postoperative wound in 1 (2.8%) case. Conversion was performed in 10 (15.6%) cases, and in one (1.5%) case, the choledochal wall was injured intraoperatively. There was no significant difference between groups A, B and C.

Conclusion. The use of two-stage treatment significantly reduces the conversion to open surgery, significantly reduces postoperative complications and hospital stay in the postoperative period. According to the results of our research, the most optimal interval between PTCS and LCE is a period of more than 4 weeks.

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Ospan Zh.R.
orcid.org/0000-0001-6803-5806
Doskhanov M.O.
orcid.org/0000-0002-8578-8567
Serikuly E.
orcid.org/0000-0002-3423-9533
Mukazhanov D.Y.
orcid.org/0000-0001-5742-2691
Hadjieva A.A.
orcid.org/0000-0002-4431-4488
Tileuov S.T.
orcid.org/0000-0003-1786-0720
Skakbayev A.S.
orcid.org/0000-0003-0372-068X
Askeev B.T.
orcid.org/0000-0002-3695-7811
Baimakhanov Zh.B.
orcid.org/0000-0003-1887-7866
Kaniyev Sh.A.
orcid.org/0000-0002-1288-0987
Chormanov A.T.
orcid.org/0000-0003-3513-1935
Baimakhanov B.B.
orcid.org/0000-0002-9839-6853
Seisembayev M.A.
orcid.org/0000-0002-1072-1675

Corresponding author.

Ospan Zh.R. – Resident of 2 year of training in the specialty «General Surgery» of «S.D. Asfendiyarov KazNMU» NC JSC, Almaty, Kazakhstan
E-mail: jambyl97@mail.ru

Conflict of interest

The authors declare that they have no conflicts of interest

Keywords:

Acute obstructive cholecystitis, Percutaneous transhepatic cholecystostomy, Laparoscopic cholecystectomy, Gallstone disease

Жедел обструктивті холецистит кезінде тері және бауыр арқылы өтетін холецистостомияның тиімділігі

Оспан Ж.Р.¹, Досханов М.О.^{1,2}, Серікұлы Е.², Мукажанов Д.Е.², Хаджиева А.А.¹, Тилеуов С.Т.², Скакбаев А.С.², Аскеев Б.Т.², Баймаханов Ж.Б.^{1,2}, Каниев Ш.А.^{1,2}, Чорманов А.Т.², Баймаханов Б.Б.^{2,1}, Сейсембаев М.А.²

¹«С.Ж. Асфендияров атындағы Қазақ Ұлттық медицина университеті» Ке АҚ, Алматы қ., Қазақстан

²«А.Н. Сызғанов атындағы Ұлттық ғылыми хирургия орталығы» АҚ, Алматы қ., Қазақстан

Аңдатпа

Жедел обтурациялық холецистит – өлім-жітім және асқын қауіпі жоғары кең таралған ауру. Жанама аурулары бар егде жастағы науқастарға жедел холецистит кезінде, қазіргі уақыттағы хирургиялық тактика, ашық және лапароскопиялық қол жетімділік айтарлықтай қауіп төндіреді. Біздің зерттеуіміздің мақсаты - жедел обструктивті холецистит кезінде тері бауыр арқылы қойылатын холецистостомияның тиімділігі және одан кейінгі лапароскопиялық холецистэктомияны талдау.

Хат алысатын автор.

Оспан Ж.Р. – «Жалпы хирургия» мамандығының 2 курс резиденті, «С.Ж. Асфендияров ат. ҚазҰМУ» Ке АҚ, Алматы қ., Қазақстан
E-mail: jambyl97@mail.ru

Мүдделер қақтығысы

Авторлар мүдделер қақтығысының жоқтығын мәлімдейді

Материал және әдістер. Біз ретроспективті түрде А.Н. Сызганов атындағы ҰҒХО-да 2017 жылдан 2021 жылдар аралығында жедел обтурациялық холециститпен емделген 64 науқасты талдадық, оларды хирургиялық емдеу көлеміне байланысты 2 топқа бөлдік. Бірінші топ науқастарына: бірінші кезеңде ТБХС (N=29), екінші кезеңде, 3 күннен 72 күн аралығында күту мерзімі өткеннен кейін ЛХЭ жасалды. Екінші топ науқастарына: өт қабын дренаждамай ЛХЭ жасаған науқастар (N=35). Сондай-ақ, бірінші топтағы науқастар күту уақытына байланысты 3 топшаға бөлінді: А топшасы - ЛХЭ ТБХС орнатылғаннан кейін 10 күн ішінде орындалды, В топшасы - ЛХЭ ТБХС орнатылғаннан кейін 2 аптадан 4 апта аралығында орындалды (N=12), С топшасы - ЛХЭ ТБХС - тан кейін 4 аптадан кейін орындалды. Операция алдындағы, операция кезіндегі деректер және операциядан кейінгі асқынулар талданды.

Нәтижелер. Операция алдындағы мәліметтер мен дене қызуында, зертханалық мәліметтерде, қосалқы ауруларда және сәйкес өрісте айтарлықтай айырмашылық анықталған жоқ. Статистикалық айырмашылық тек науқастардың жасында анықталды (65.3 ± 9.0 vs 53.4 ± 15.4). ЛХЭ операция ұзақтығы бірінші топпен салыстырғанда, екінші топта ұзағырақ болды, бірақ айтарлықтай айырмашылық анықталмады (108.1 ± 30.5 vs 117.9 ± 39.9). ЛХЭ-дан соң операциядан кейінгі кезеңде 5 (14,2%) жағдайда асқынулар байқалды: 4 (11,4%) жағдайда қан кету және 1 (2,8%) жағдайда операциядан кейінгі жараның іріңдеуі. Операциядан кейінгі жараның іріңдеуіне байланысты жара, қайталама кернеумен жазылды. Лапаротомияға конверсия 10 (15,6%) жағдайда жүргізілді, бір (1,5%) жағдайда операция ағымында холедохтың қабырғасы зақымдалды. Сондай-ақ, А, В және С топтары арасында айтарлықтай айырмашылық анықталған жоқ.

Қорытынды. Осылайша, жедел обструктивті холецистит кезінде екі сатылы емдеуді қолдану (ТБХС, ЛХЭ) ашық операцияға конверсияны едәуір азайтады, операциядан кейінгі асқынуды сенімді түрде азайтады және операциядан кейінгі кезеңде төсек-орын күндерін азайтады. Біздің зерттеу нәтижелерімізге сәйкес, ТБХС пен ЛХЭ арасындағы ең оңтайлы аралық мерзімі 4 аптадан астам уақыт.

Түйін сөздер:
жедел обтурациялық холецистит, тері бауыр арқылы холецистостомия, лапароскопиялық холецистэктомия, өт тас ауруы

Эффективность чрескожной чреспеченочной холецистостомии при остром обструктивном холецистите

Автор для корреспонденции:
Оспан Ж.Р. – Резидент 2 года обучения по специальности «Общая хирургия», НАО «КазНМУ им. С.Д. Асфендиярова» г. Алматы, Казахстан
E-mail: jambyl97@mail.ru

Оспан Ж.Р.¹, Досханов М.О.^{1,2}, Серікұлы Е.², Мукажанов Д.Е.², Хаджиева А.А.¹, Тилеуов С.Т.², Скакбаев А.С.², Аскеев Б.Т.², Баймаханов Ж.Б.^{1,2}, Каниев Ш.А.^{1,2}, Чорманов А.Т.², Баймаханов Б.Б.^{2,1}, Сейсембаев М.А.²

¹ НАО «Казахский Национальный медицинский университет им. С.Д. Асфендиярова», г. Алматы, Казахстан

² АО «Национальный научный центр хирургии им. А.Н. Сызганова», г. Алматы, Казахстан

Аннотация

Острый обтурационный холецистит - распространенное заболевание со значительным риском смертности и осложнений. Активная хирургическая тактика, как открытый и лапароскопический доступ, представляет значительный риск для пациентов пожилого возраста с наличием сопутствующих заболеваний на фоне острого холецистита. Целью нашего исследования является анализ эффективности чрескожной чреспеченочной холецистостомии (ЧЧХС) при остром обтурационном холецистите и последующем лапароскопической холецистэктомии (ЛХЭ).

Материал и методы. Ретроспективно нами было проанализировано 64 пациентов пролеченных с острым обтурационным холециститом в период с 2017 года по 2021 год в ННЦХ им. А.Н. Сызганова, которых мы разделили на 2 группы в зависимости от объема хирургического лечения. Первая группа: пациенты, которым первым этапом установлена ЧЧХС (n=29), вторым этапом, было произведена ЛХЭ в период выжидания от 3 дней до 72 дней. Вторая группа: пациенты, которым была выполнена ЛХЭ без дренирования желчного пузыря (n=35). Также пациенты первой группы разделены на 3 подгруппы в зависимости от времени выжидания: группа А - ЛХЭ выполнена в течение 10 дней после установки ЧЧХС, подгруппа В - ЛХЭ выполнена через от 2 недель по 4 недель (n=12), пациентам подгруппы С ЛХЭ выполнена более чем 4 недель после ЧЧХС. Были проанализированы предоперационные, интраоперационные данные и послеоперационные осложнения.

Результаты. По предоперационным данным, значительной разницы в поле, температуре тела, лабораторным данным и сопутствующих заболеваниях не выявлена. Статистическая разница была выявлена только в возрасте пациентов (65.3 ± 9.0 vs 53.4 ± 15.4). Продолжительность операции во

Конфликт интересов
Авторы заявляют об отсутствии конфликта интересов

Ключевые слова:
Острый обтурационный холецистит, чрескожная чреспеченочная холецистостомия, лапароскопическая холецистэктомия, желчнокаменная болезнь

второй группе ЛХЭ было больше по сравнению с первой группой, однако значительной разницы не выявлены ($108,1 \pm 30,5$ vs $117,9 \pm 39,9$). В послеоперационном периоде после ЛХЭ в 5 (14,2%) случаях наблюдались осложнения: кровотечение 4 (11,4%) случая и нагноение послеоперационной раны в 1 (2,8%) случае. Рана заживала вторичным натяжением в связи с нагноением послеоперационной раны. Конверсия на лапаротомию была произведена в 10 (15,6%) случаях, в одном (1,5%) случае интраоперационно была повреждена стенка холедоха. Также значительной разницы между группами А, В и С, не выявлена.

Вывод. Таким образом при остром обтурационном холецистите применение двухэтапного лечения (ЧЧХС, ЛХЭ) значительно уменьшает конверсию на открытую операцию, достоверно снижает послеоперационное осложнение и меньше койко дней в послеоперационном периоде. Согласно результатам наших исследований, самый оптимальный интервал между ЧЧХС и ЛХЭ является срок более 4 недель.

Relevance

Acute obstructive cholecystitis (AOC) is a common disease with a significant risk of mortality and complications, especially in severe cases of general condition against the background of comorbidities [1]. The "gold standard" for the treatment of this disease is laparoscopic cholecystectomy (LCE) [2]. Traditionally, "open" surgery is reserved for destructive forms of AOC with peritonitis and severe inflammation [3]. Despite the advances made by medical science: ultrasound diagnostics, endosurgical and minimally invasive methods of treating acute cholecystitis still remain the most urgent problem in surgery [4]. According to many authors, about 60% of patients hospitalized in surgical departments for acute cholecystitis will be at high operational risk due to concomitant diseases (cardiovascular disease, chronic lung disease, chronic kidney disease or hypothyroidism, etc.) [5, 6]. Laparoscopic interventions are contraindicated for these patients, due to the fact that this technique involves the use of endotracheal anesthesia, mechanical ventilation, tensioncarboxypneumoperitoneum, the use of electric current for hemostasis and treatment of the gallbladder bed. Elderly patients with subcompensated concomitant pathology are also undesirable "open" cholecystectomy. In this connection, most often in this category of patients, operations draining the gallbladder are used [7]. The essence of gallbladder draining operations is as follows: to level gallbladder hypertension, thereby creating conditions for reducing edema, restoring normal blood circulation in the gallbladder wall, and ultimately stopping an attack of

acute cholecystitis. Currently, in patients with a high operational and anesthetic risk, ultrasound (US) guided percutaneous transhepatic cholecystostomy (PTCS) is most often used, this method has a number of advantages: general anesthesia is not required, speed and ease of implementation, the ability to perform even with complicated forms of acute cholecystitis [8, 9].

According to various studies, PTCS under US, in addition to expectant management, is the only method that prevents serious complications of acute cholecystitis, including empyema, gangrene, perforation or sepsis [10, 11]. It has also recently been suggested that, in some cases, PTCS may provide definitive and safe treatment [12, 13]. For many patients, this serves as a bridge to two-stage surgery [14, 15]. Our work is devoted to a two-stage surgical intervention.

Purpose of study is analysis of the effectiveness of PTCS in AOC and subsequent LCE.

Material and methods

We retrospectively analyzed the clinical data of 64 patients treated with AOC during 2017 to 2021 at the A.N. Syzganov National Scientific Center of Surgery. AOC was diagnosed based on complaints, clinical and laboratory-instrumental (full blood count, urinalysis, biochemical blood test, fibrogastroduodenoscopy, US of abdomen) examination. After the diagnosis of AOC was established, the patients underwent PTCS or LCE (Fig. 1). The mean age of all patients was 58.7 ± 13.0 years (23-95). There were 30 men (46.8%) and 34 women (53.2%).

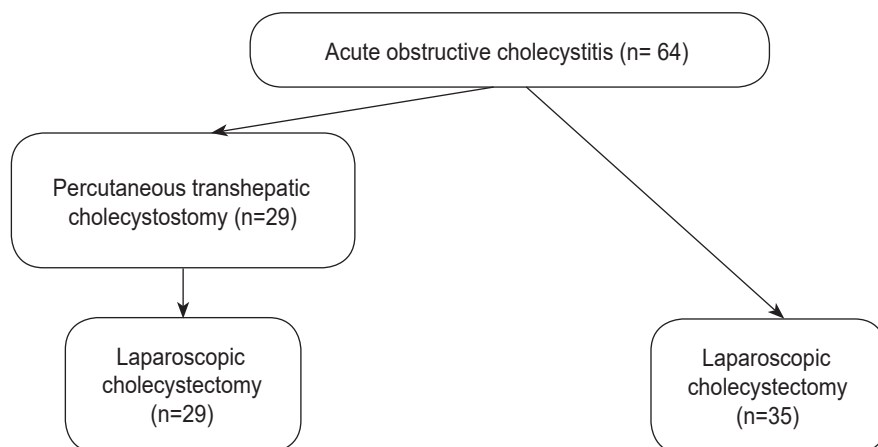


Figure 1. Study design

Depending on the type of surgical treatment, patients with AOC, were divided into two groups:

1. The first group: patients who underwent PTCS at the first stage (n=29), at the second stage, LCE was performed after 10 days. In this group, the average age was 65.3 ± 9.0 years (43 - 95).

The indication for PTCS was an acute inflamed gallbladder and a high risk of intra- and postoperative complications.

Inclusion Criteria:

- strained gallbladder (according to US)
- the wall of the gallbladder is more than 5 mm.

(according to US)

Exclusion Criteria:

- chronic calculous cholecystitis
- ascites (presence of free fluid in the abdomen)
- gallbladder wall less than 5 mm.

According to the timing of the operation, these patients were divided into three subgroups: A, B and C. In patients of subgroup A, LCE was performed

within 10 days (mean 5.3 ± 2.4 days (mean 3-9 days) after PTCS (n=3), in patients of subgroup B, LCE was performed from 2 weeks to 4 weeks (mean 20.1 ± 3.8 days) after PTCS (n=12), in patients of subgroup C, LCE performed after more than 4 weeks (mean 51.2 ± 13.9 days (29 days - 72 days)) after PTCS (n=14).

In subgroup A, the mean age was 83 ± 8 years. In this group, men accounted for 1 patient (33.3%), women accounted for 2 patients (66.7%). In subgroup B, the mean age was 63.5 ± 9.7 years (43 years - 85 years). In this subgroup, men accounted for 41.6% (5 patients), women 58.4% (7 patients). In subgroup C, the mean age was 63 ± 6.5 years (48 years - 77 years). In this group, 6 patients (42.8%) were males and 8 patients (57.2%) were females.

All patients of the first group, PTCS was placed on the first day of hospitalization, due to pain, high fever and according to the US picture of AOC (Figure 2, 3). Subsequently, these patients (45.3%) underwent LCE.

Figure 2.
Puncture and placement of percutaneous transhepatic cholecystostomy under ultrasound guidance

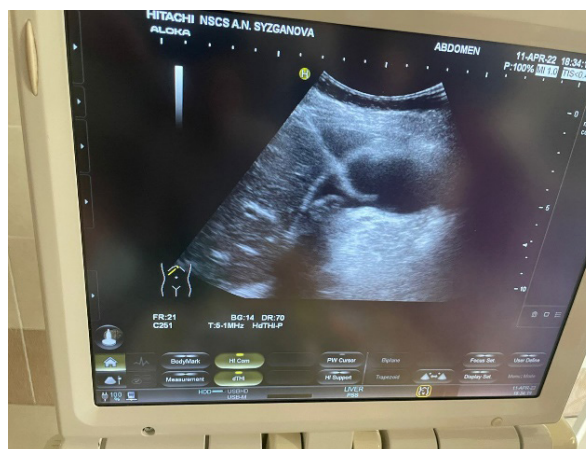


Figure 3.
After insertion of the drain into the gallbladder cavity



The second group: patients who underwent LCE (n=35). The mean age in this group was 53.4 ± 15.4 years. In the second group of 35 patients, there were 16 men (45.7%), 19 women (54.3%).

We divided all patients with AOC into two groups to compare the types of surgical treatment. The clinical results of patients in both groups were analyzed during the follow-up period. We studied the duration

of the operation, complications, conversions and postoperative bed days using data processing in Microsoft Excel, GraphPad.

Results

In our observations in all patients, we obtained the following results: conversion to laparotomy was in 10 (15.6%) cases, in one (1.5%) case, the choledochal wall was injured intraoperatively. Postoperative

complications were observed in 3 (4.6%) cases, postoperative bed-days averaged 5.25 ± 1.2 days.

After PTCS in all patients of the first group, the body temperature returned to normal, pain in the right hypochondrium was stopped.

Control studies showed the subsidence of acute

inflammation, the disappearance of intoxication. On the control US, regression of echographic signs of gallbladder destruction was observed. Subsequently, LCE was performed with a waiting period of 3 days to 72 days, on average 33.6 ± 17.5 days.

	Cholecystostomy + LCE	LCE	P-value
	(n=29)	(n=35)	
	mean±st. deviation (min.-max.)	mean±st. deviation (min.-max.)	
Age	65.3 ± 9.0 (43-95)	53.4 ± 15.4 (23-81)	p>0.05
Gender (m/f)	(12/17)	(16/19)	ns
Body temperature	37.2 ± 0.4 (36-39.5)	37.2 ± 0.5 (36.1-38.5)	ns
Laboratory data			
Bilirubin	25.08 ± 12.9 (93.5 - 4.6)	18.5 ± 9.4 (70.3 - 3.4)	ns
Leukocytes	9.3 ± 3.2 (16-3)	9.2 ± 3.3 (19-3)	ns
Amylase	42.1 ± 15.7 (112 - 15)	50.5 ± 18.5 (128.9 - 21)	ns
Concomitant disease			
Respiratory system	2	-	ns
The cardiovascular system	16	16	ns
Diabetes mellitus	2	2	ns
Intraoperative and postoperative data			
Duration of operations	108.1±30.5 (60-180)	117.9±39.9 (60-320)	ns
Conversion	1	9	p<0,05
Complications	0	6	p<0,05
Hospital stay	4.4 ± 0.8 (3 - 10)	6.1 ± 1.6 (2 - 20)	p<0,05

Table 1.

Depending on the method of surgical treatment performed - PTCS and LCE, the following improvements were obtained in each group: postoperative hospital stay and conversion

In the first group, the average age was 65.3 years (43-95), the average age in the second group was 53.4 years (23-81). A statistical difference was found. In the first group, patients are comparatively older by 18.3% than patients in the second group (p=0.05).

The duration of the operation in the first group averaged 108.1 min ± 30.5 (60-180 min), the duration of the operation in the second group averaged 117.9 min ± 39.9 (60-320 min). When compared, no statistical difference was found.

The average leukocytes in patients of the first group during hospitalization were $9.3 \pm 3.2 \times 10^9/l$. (3-16x10⁹/l), 3-5 days after cholecystostomy was $6.8 \pm 1.6 \times 10^9/l$ (3-12 x10⁹/l)). Similarly, in patients of the second group, the average leukocyte count during hospitalization was $9.2 \pm 3.3 \times 10^9/l$ (3-19x10⁹/l), on days 3-5 $8.6 \pm 1.8 \times 10^9/l$ (4-17x10⁹/l). When compared, no statistical difference was found.

In the first group of patients, at the second stage of treatment, when attempting LCE, in 1 (3.4%) case, conversion to laparotomy was performed due to a massive adhesive process. Comparatively, in the second group, conversion was performed in 9 (25.7%) cases due to an acute inflammatory process. Frequency conversion was higher in patients of the second group by 90% (p=0.05).

In the postoperative period, no increase in body temperature was observed in the first group; in the

second group, 21 (60%) patients experienced an increase in temperature up to 38C.

There were no complications during the operation in the first group of patients. In the second group, intraoperative complications were observed in 6 (17.1%) cases. In one (2.8%) case, the choledochal wall was injured intraoperatively, laparoscopic suturing of the choledochal wall was performed with removal of Pikoovsky drainage. In the postoperative period, after LCE, in 5 (14.2%) cases, there were complications: bleeding in 4 (11.4%) cases and suppuration of the postoperative wound in 1 (2.8%) case. 4 patients with postoperative bleeding had the intake of hemorrhagic nature of the discharge through the control drainage and a decrease in red blood cells, relaparoscopy was performed, the source of bleeding was the gallbladder bed. Hemostasis was achieved with the help of additional coagulation of bleeding sites, the operation was completed by drainage of the subhepatic space. There was no recurrence of bleeding in any case. When comparing the number of postoperative complications a statistically significant difference was found.

Postoperative hospital stay in the first group averaged 4±0.8 days and in the second group it averaged 6±1.6 days. Statistical difference was found. Postoperative hospital stay in patients of the second group were 38.6% higher than in patients of the first group.

Table 2.

Distribution of patients of the first group according to the terms of the operation: LCE after PTCS

	Cholecystostomy + LCE			P-value
	Group A Within 10 days (n=3)	Group B From 14 days to 28 days (n=12)	Group C More than 28 days (n=14)	
	M±m (min.-max.)	M±m (min.-max.)	M±m (min.-max.)	
Conversion	0	1	0	ns
Duration of operation	105 ± 36.6 min (160-65)	109.5 ± 32.0 min (180-60)	113.9 ± 29.4 min (180-60)	ns
Complications	0	0	0	ns

Depending on the interval of LCE after PTCS in subgroup B, in 1 (8.3%) case, when attempting LCE, conversion to laparotomy was performed due to massive adhesions. The duration of the operation in subgroup A averaged 105 ± 36.6 min (65-160 min), the duration of the operation in the subgroup averaged 109.5 ± 32.0 min (60-180 min), in subgroup C the average duration of the operation was 113.9 ± 29.4 min (60-180 min). No complications were observed in all subgroups (Table 2).

Discussion

AOC is a common disease with a frequency of 1-3% per year in patients with gallstones (10-20%) [16, 17]. Acute cholecystitis carries a risk of complications, including empyema, gangrene, perforation, and peritonitis. In addition, morbidity and mortality associated with emergency cholecystectomy in critically ill patients: 55-66% and 14-30%, respectively [18].

PTCS is the operation of choice for AOC, in critically ill, aged patients and in patients with concomitant pathologies. The technical success rate of PTCS can be very high in experienced hands, with reported rates of 95-100% [19].

Indications for the use of PTCS for the treatment of acute cholecystitis vary across centers but generally include patients at high surgical risk who have a comorbid condition with severe acute cholecystitis. The latest published guideline "Tokyo Guidelines" mentions moderate acute cholecystitis is also an indication [20,

21], due to a disease duration of more than 72 hours, the latter of which is likely due to severe inflammation and tight adhesions and therefore a higher risk of conversion and cholecystectomy complications [22, 23].

PTCS is performed to decompress the gallbladder in AOC. Consistently, as a result of drainage, a decrease in pain syndrome is observed against the background of regression of the inflammatory process. Comparatively in patients according to statistical data, after surgical treatment, against the background of inflammation of the gallbladder, there are more complications compared to patients who underwent preliminary drainage of the gallbladder [24].

The use of the technique of two-stage treatment of AOC, using US-guided PTCS as the first stage, significantly reduced the incidence of intraoperative and postoperative complications. Most significantly managed to reduce the number of conversion, purulent-inflammatory complications. This pattern finds a quite obvious explanation: in fact, LCE is performed under conditions of subsided inflammation and after appropriate preparation of the patient, i.e. in the so-called "cold" period [8, 9].

Our study shows that in AOC, the use of two-stage treatment (PTCS, LCE) significantly reduces the number of conversions to open surgery, reduces postoperative complications and the number of hospital stay in the postoperative period (p<0.05).

Table 3.

Data literature on percutaneous transhepatic cholecystostomy followed by cholecystectomy

Years	Authors	Study design	Database	Comparison	Results
2009	Kim et al. [25]	Retrospective	Single medical center	≤7 days (n=35) vs 14-39 days (n = 38)	In a group ≤ 7 days total hospital stay was shorter
2015	Jung et al. [26]	Retrospective	Single medical center	≤10 days (n = 30) vs. >10 days (n = 44)	There were no differences between operative time, postoperative hospital stay, conversion to open cholecystectomy, or post-operative complications.
2019	Altieri et al. [27]	Retrospective	New York State SPARCS Database	≤ 8 weeks (n = 1211) vs > 8 weeks (n=1787)	≤ The 8 weeks group had a higher complication rate and longer stay

SPARCS - A nationwide system for planning and collaborating in research.

The optimal timing of intermittent cholecystectomy remains one of the major concerns in LCE patients with PTCS. Kim's studies looked at the impact of the timing of LCE as a second step after PTCS and not earlier than 14 days, this reduces conversion and complication rates, but increases hospital stay, and patients suffer the inconvenience associated with a cholecystostomy tube [25]. Jung et al. in their studies reported that the most common complication after PTCS was catheter-related (displaced catheter), and therefore it was suggested that LCE was preferable within 10 days after PTCS [26]. Altieri et al. in studies by the patient after PTCS, expected LCE at intervals

greater than 8 weeks (Table 3) [27]. The results of our study show, which is the optimal interval between PTCS and LCE is more than 4 weeks. LCE, which was performed up to 4 weeks, led to difficulties due to the preserved inflammatory process of the gallbladder and around the gallbladder.

Conclusions

The use of two-stage treatment significantly reduces the conversion to open surgery, significantly reduces postoperative complications and hospital stay in the postoperative period. According to the results of our research, the best interval between PTBD and LCE is over 4 weeks.

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