

Acute cholecystitis during the COVID-19 pandemic: is percutaneous cholecystostomy a good alternative for treatment?

Mustafa Dönmez^{1,2}, Zuhale Özgün Erkeskin², Tezcan Akın², Erdinç Çetinkaya², Özgür Akgül², Ali Emre Akgün², Hüseyin Berkem², Bülent Cavit Yüksel², Sadettin Er²

¹Ankara Yıldırım Beyazıt University, General Surgery Department, Ankara, Türkiye

²Ankara City Hospital, General Surgery Department, Ankara, Türkiye

Cite this article as: Dönmez M, Erkeskin ZÖ, Akın T, et al. Acute cholecystitis during the COVID-19 pandemic: is percutaneous cholecystostomy a good alternative for treatment?. J Health Sci Med 2022; 5(6): 1572-1575.

ABSTRACT

Aim: To evaluate the efficacy, safety, and results of percutaneous cholecystostomy in patients with acute cholecystitis diagnosed with COVID-19.

Material and Method: The demographic characteristics, comorbidities, and acute cholecystitis grading of patients according to the Tokyo guideline 2018 (TG18) were evaluated. Mortality, laboratory parameters, radiological findings, physical status scores according to the American Society of Anesthesiologists (ASA) assessment, and the Charlson Comorbidity Index (CCI) were retrospectively evaluated in a total of 38 patients who underwent percutaneous cholecystostomy.

Results: The mean age of the 38 patients was 75±9 years, and 21 (55.3%) were female and 17 (44.7%) were male. According to TG18, 33 (86.8%) of the patients had grade II and five (13.2%) had grade III cholecystitis, while there was no grade I case. The mean CCI of the patients was 7.32±2.1. The ASA scores were mostly IIIIE, followed by IIE. The COVID-19 test was positive in 33 (86.8%) of the patients. Mortality developed in four (10.5%) patients during hospitalization.

Conclusion: Percutaneous cholecystostomy can be considered as a safe, effective, and alternative method in the treatment of patients with acute cholecystitis.

Keywords: Acute cholecystitis, COVID-19, percutaneous cholecystostomy

INTRODUCTION

Acute cholecystitis (AC) is an emergency that mostly occurs as a result of gallbladder infection. It usually presents with pain in the right upper abdomen and under the right scapula, nausea, vomiting, and occasionally fever. According to the World Society of Emergency Surgery and Tokyo Guidelines, early laparoscopic surgery is the gold standard recommended to be performed as soon as the diagnosis has been made and the risk of choledocholithiasis has been evaluated (1,2). While conservative treatment is indicated in patients with a high risk of morbidity or mortality, percutaneous cholecystostomy (PC) is recommended as an alternative treatment method if the patient does not respond to conservative treatment (2).

During the COVID-19 pandemic, medical organizations such as the Society of American Gastrointestinal and

Endoscopic Surgeons and the European Association for Endoscopic Surgery have suggested that an alternative approach to surgery, i.e., antibiotic therapy, PC, and watch-wait, should be preferred in as cases where possible (3). The onset of the pandemic was difficult in many aspects. Most importantly, there was no safe environment in the hospital for patients or healthcare workers. Furthermore, treatment guidelines for the management of acute surgical disease in patients with COVID-19 were initially inadequate.

In Turkey, the first case of COVID-19 was officially reported on March 11, 2020. There are studies in the literature in which laparoscopic surgery and endoscopic procedures are not recommended in case of suspected or diagnosed COVID-19 disease (4).

Studies have reported that the diagnosis or suspicion of COVID-19, as well as low reserve and high comorbidity

may increase the risk of perioperative morbidity and mortality (4). In the current study, the efficacy, safety, and results of PC were evaluated in patients with AC diagnosed with COVID-19.

MATERIAL AND METHOD

The study was initiated with the approval by the Ankara City Hospital Clinical Researches Ethics Committee (Date: 03.08.2022, Decision No: E2-22-2240). All procedures were performed adhered to the ethical rules and principles of the Helsinki Declaration.

Patient Data

The records of patients admitted to the General Surgery/Emergency Surgery Service of Ankara City Hospital and underwent PC between September 2020 and May 2022 were retrospectively screened from the hospital's electronic system. From these records, demographic characteristics, comorbidities, and AC grading criteria according to the Tokyo guideline 2018 (TG18) were obtained. Mortality, laboratory parameters, radiological findings, physical condition scores according to the American Society of Anesthesiologists (ASA) assessment and the Charlson Comorbidity Index (CCI) were evaluated. Patients with coagulopathies or perforated gallbladder and those without gallstones were not included in the study. As a result of the eligibility evaluation, 38 patients were included in the study. The diagnosis of AC was confirmed using TG18 based on clinical, laboratory, and radiological findings. All grade I, II, and III acute cases according to TG18 were included in the study. In all the patients, oral nutrition was discontinued, and intravenous hydration and medical therapy with antibiotics (second-generation cephalosporin) were started.

PC was performed by a radiologist using the ultrasound-guided Seldinger technique and placing an 8-12-F catheter into the gallbladder through the transhepatic route. During the intervention, first, aspiration was performed, and then the gallbladder and bile ducts were visualized. After the catheter was inserted, the position of the catheter was confirmed using a contrast agent. The patency of the cystic duct and distal common bile duct was evaluated using a cholecystogram. The decision to remove the catheter was made according to the contrast transition and clinical improvement in the cystic duct and distal common duct.

Statistical Analysis

The Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, United States) version 16.0 for Windows were used for statistical analysis of the data. In addition to descriptive statistical methods (mean and standard deviation), the distribution of data was expressed as a percentage.

RESULTS

The age of the 38 patients included in the study was 75 ± 9 years, and 21 (55.3%) were female and 17 (44.7%) were male. According to TG18, 33 (86.8%) of the patients had grade II and 5 (13.2%) had grade III AC, while there was no grade I case. The mean CCI of the patients was 7.32 ± 2.1 . The ASA scores of the patients were mostly IIIE, followed by IIE. The COVID-19 test was positive in 5 (13.2%) of the patients. The remaining patients tested negative.

Mortality developed in four (10.5%) patients during hospitalization. Catheter removal was performed on average 21 (14-42) days after catheterization according to the clinical and laboratory data of the patients. Elective cholecystectomy was performed in four (10.5%) patients, of whom all were negative for COVID-19. The demographic and clinical data of all the patients are summarized in **Table 1**. Among the comorbidities of the patients, hypertension was the most common ($n=29$, 76.3%), followed by cerebrovascular and nephrological diseases. No catheter-related complications were observed in patients after PC; however, acute pancreatitis, hepatic abscess, AC recurrence, and cerebrovascular disease developed due to other causes. **Table 2** and **Table 3** summarize the comorbidities of the patients and complications that occurred after PC, respectively.

Table 1. Demographic data and clinicopathological characteristics of the patients

Variables	Number of patients (n=38) (%)
Age (mean \pm SD)	75 \pm 9
Gender	
Female	21 (55.3)
Male	17 (44.7)
Tokyo Guideline 2018 grade (%)	
Grade I	0
Grade II	33 (86.8)
Grade III	5 (13.2)
CCI (mean \pm SD)	7.32 \pm 2.1
ASA score	
IE	0
IIE	16 (42.1)
IIIE	20 (52.6)
IVE	2 (5.3)
COVID-19 positivity	
(-)	33 (86.8)
(+)	5 (13.2)
Cholecystectomy	4 (10.5)
Mortality	4 (10.5)
Catheter Removal Time (days, mean, min-max)	21 (14-42)

SD: Standard Deviation, ASA: American Society of Anesthesiology, CCI: Charlson Comorbidity Index

Table 2. Comorbidities of the patients

Comorbidity	Patient number (n=38) (%)
Hypertension	29 (76.3)
Diabetes mellitus	6 (15.8)
Chronic renal failure	10 (26.3)
Neurological disease	18 (47.4)
History of cerebrovascular disease	13 (34.2)
Congestive heart failure	13 (34.2)
Coronary artery disease	5 (13.2)
Chronic obstructive pulmonary disease	5 (13.2)
History of malignancy	2 (5.3)

Table 3. Complications that developed after percutaneous cholecystostomy

Complication	Patient number (n=38) (%)
Cholecystostomy-related	-
Other	4 (10.4)
Acute biliary pancreatitis	1 (2.6)
Hepatic abscess	1 (2.6)
Recurrence of acute cholecystitis at week 3	1 (2.6)
Cerebrovascular event	1 (2.6)

DISCUSSION

PC is one of the alternative treatment methods to conservative or surgical intervention in cholecystitis. PC has become a procedure preferred in patients with high comorbidity, advanced age, and generally poor conditions that make them unsuitable for surgery. Furthermore, the COVID-19 pandemic has resulted in an increase in the number of PCs performed. In particular, the risk of viral transmission due to surgical smoke and uncertainties concerning the evacuation of carbon dioxide gas after laparoscopic procedures have led to an increased tendency toward non-surgical treatments (5).

A typical radiological finding in patients with COVID-19 is the appearance of ground glass opacity in the form of a nodule or mass located in the peripheral and posterior position, usually in the form of organized pneumonia. In addition, consolidations, and linear, curvilinear, and perilobular opacities may also be present (6,7). In these patients, pulmonary involvement, additional comorbidities, and the presence of AC increase the morbidity and mortality associated with the surgical procedure. In a study conducted in Wuhan, China, it was determined that 41% of patients hospitalized with COVID-19 developed acute respiratory distress syndrome (ARDS), and an age over 65 years, diabetes mellitus, and hypertension were factors associated with ARDS development (8). The coexistence of AC and COVID-19 is rarely seen. In such cases, care should be taken in terms of treatment selection and planning. Laparoscopic cholecystectomy is currently the most accepted treatment option in the treatment of AC (9); however, this operation is performed by creating an artificial pneumoperitoneum,

and ultrasonic or electrical equipment used generates large volumes of surgical fumes, placing the surgical team at risk of aerosol exposure. Therefore, laparoscopic surgery and endoscopic procedures are generally not recommended in patients with diagnosed or suspected COVID-19 (10). Initial data from China indicated that asymptomatic COVID-19-positive patients undergoing early surgery who developed pneumonia had an increasing global mortality rate and adverse clinical outcomes (11). For this reason, most elective operations, especially those requiring intensive care support, were postponed (12). PC is a good alternative method in these difficult-to-manage cases. In the current study, the coexistence of COVID-19 with AC was detected in 13.2% of the patients. PC was preferred as priority treatment in the majority of cases due to the presence of comorbidities.

A CCI above 6 is a factor associated with increased postoperative complications, and there is a strong correlation between the ASA grade and the decision for radiological and potential surgical treatment (13). In our study, the mean CCI of the patients was 7.32 ± 2.1 , and the ASA score was mostly IIE and above.

PC should be kept in mind as an alternative treatment method in case of abscess and sepsis in AC. Today, local symptoms and inflammatory response can be controlled with PC (14). Clinical success is generally defined as a decrease in fever, leukocyte count, and pain within 72 hours (15). In a review by Winbladh et al. (15), it was reported that in up to 40% of patients undergoing PC, the procedure was performed electively. However, in the current study, only four (10.5%) patients underwent elective cholecystectomy. This lower rate compared to the literature may be associated with the majority of our patients having had COVID-19.

The pandemic has had a great impact on the approach to many surgical emergencies, including the alteration of surgical priorities in the treatment of AC. Several studies have reported a trend toward more conservative approaches, such as the use of antibiotics or PC for the treatment of AC compared with early laparoscopic cholecystectomy, which was widely used in the pre-pandemic period.

The important limitations of this study are its retrospective nature and small patient population.

CONCLUSION

PC can be considered as a first-line treatment option, as well as being an alternative and safe method in high-risk patients, including those with comorbidities and COVID-19. In addition, PC is a good bridging treatment option in cases planned to undergo elective cholecystectomy.

There is no person/organization that supports the study financially and the authors do not have any interest-based relationship.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was initiated with the approval by the Ankara City Hospital Clinical Researches Ethics Committee (Date: 03.08.2022, Decision No: E2-22-2240).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

REFERENCES

1. Ansaloni L, Pisano M, Coccolini F, et al. 2016 WSES guidelines on acute calculous cholecystitis. *World J Emerg Surg* 2016; 11: 1-23.
2. Yokoe M, Hata J, Takada T, et al. Tokyo Guidelines 2018: diagnostic criteria and severity grading of acute cholecystitis (with videos). *Journal of Hepato-biliary-pancreatic Sci* 2018; 25: 41-54.
3. Stavridis K, Liosis I, Konstantinidis MK, Kondylis G, Ioannidis A. COVID-19 and Acute Cholecystitis Management: A Systematic Review of Current Literature. *Front Surg* 2022; 9: 871685.
4. Karaca AS, Özmen MM, Uçar AD, Yastı AÇ, Demirel S. COVID-19'lu hastalarda genel cerrahi ameliyathane uygulamaları. *Türk J Surg* 2020; 36: 6-10.
5. Antunes D, Lami M, Chukwudi A, et al. COVID-19 infection risk by open and laparoscopic surgical smoke: a systematic review of the literature. *The Surgeon* 2021; 19: e452-e61.
6. Rotzinger D, Beigelman-Aubry C, Von Garnier C, Qanadli S. Pulmonary embolism in patients with COVID-19: time to change the paradigm of computed tomography. *Thromb Res* 2020; 190: 58-9.
7. Ai T, Yang Z, Hou H, et al. Correlation of chest CT and RT-PCR testing in coronavirus disease 2019 (COVID-19) in China: a report of 1014 cases. *Radiology* 2020: 200642.
8. Wu C, Chen X, Cai Y, et al. Risk factors associated with acute respiratory distress syndrome and death in patients with coronavirus disease 2019 pneumonia in Wuhan, China. *JAMA Int Med* 2020; 180: 934-43.
9. Loozen CS, van Santvoort HC, van Duijvendijk P, et al. Laparoscopic cholecystectomy versus percutaneous catheter drainage for acute cholecystitis in high risk patients (CHOCOLATE): multicentre randomised clinical trial. *BMJ* 2018; 363: k3965.
10. COVID, ACS. 19: elective case triage guidelines for surgical care. ACS website Published March. 2020: 24.
11. Ding BTK, Tan KG, Oh JY-L, Lee KT. Orthopaedic surgery after COVID-19—a blueprint for resuming elective surgery after a pandemic. *Int J Surg* 2020; 80: 162-7.
12. Zheng MH, Boni L, Fingerhut A. Minimally invasive surgery and the novel coronavirus outbreak: lessons learned in China and Italy. *Ann Surg* 2020; 272: e5-e6.
13. Shakir T, Matwala K, Vasani A, Karamanakis S. Percutaneous cholecystostomy for acute cholecystitis: a three-year single-centre experience including during COVID-19. *Cureus* 2021; 13: 12.
14. Griniatsos J, Petrou A, Pappas P, et al. Percutaneous cholecystostomy without interval cholecystectomy as definitive treatment of acute cholecystitis in elderly and critically ill patients. *Southern Med J* 2008; 101: 586-90.
15. Winblad A, Gullstrand P, Svanvik J, Sandström P. Systematic review of cholecystostomy as a treatment option in acute cholecystitis. *HPB* 2009; 11: 183-93.