HAYDARPAŞA NUMUNE MEDICAL JOURNAL

DOI: 10.14744/hnhj.2022.75975
Haydarpasa Numune Med J 2024;64(1):35–39

ORIGINAL ARTICLE

Importance of Percutaneous Cholecystostomy in the Treatment of High-Risk Acute Cholecystitis Patients

Doğan Erdoğan

Department of General Surgery, University of Health Sciences Turkiye, Haydarpasa Numune Training and Research Hospital, Istanbul, Turkiye

Abstract

Introduction: The prevalence of acute calculous cholecystitis (ACC) increases with age, and the majority of these patients have high comorbidities. In high-risk patients with increased comorbidities, conservative treatment or percutaneous cholecystostomy (PC) may be chosen instead of surgical treatment, depending on the center experience and the patient's risk status. Our aim is to investigate the efficacy and safety of PC, ACC recurrence rates, and the surgical need in Tokyo Grade of Severity - Grade 3 patients with high surgical risks.

Methods: Twenty patients who applied to Haydarpaşa Numune Training and Research Hospital between December 2012 and February 2020, with Grade 3 severity acute cholecystitis (Tokyo guidelines), were included in the study. All were diagnosed with acute cholecystitis using the 2018 Tokyo criteria and treated with percutaneous cholecystostomy. Patient data were obtained through retrospective screening.

Results: Eight (40.0%) of the total patients were female and 12 (60.0%) were male. The mean age of the patients was 78.6±9.9 years. The mean hospital stay was 17.8±11.8 days. The technical success of the PC procedure was 100%. The mean duration of the catheters was 29.0±14.7 days. No procedure-related mortality was observed. 100% of the patients had comorbidities, with all having more than one comorbidity. All patients were grade 3 according to the Tokyo severity rating. All were evaluated as ASA IV due to comorbidities and found to be at high risk for surgery. The follow-up period was 12 months. Mortality was calculated for 90 days, and mortality was observed in 3 (15%) patients.

Discussion and Conclusion: PC can be an effective and safe treatment method that can be applied before cholecystectomy or for permanent treatment to avoid mortality and morbidity in high-risk patients who are not suitable for surgery.

Keywords: Acute cholecystitis; Percutaneous cholecystostomy; Tokyo criteria.

The most common complication of cholelithiasis is acute cholecystitis. Acute calculous cholecystitis (ACC) is one of the most common surgical emergencies. Gallbladder perforation develops in 2–11% of cases of acute calculous cholecystitis[1]. The prevalence of ACC increases with age, and 50–70% of the patients who apply for surgical treatment are elderly and have high comorbidities[2]. There are three approaches in the current treatment of acute calculous cholecystitis: conservative methods, surgical treatment, and percutaneous cholecystostomy. The standard treatment for acute cholecystitis is laparoscopic cholecystectomy[1]. However, there is ongoing debate about the treatment to be applied in patients with high surgical risk. In the Tokyo guideline, published in 2013 and updated in 2018, acute cholecystitis severity is graded as mild, moderate, and severe[3-5]. Early laparoscopic cholecystectomy is the first choice in the treatment of low surgical risk patients without comorbidities. In high-risk patients with comorbidities, surgery can be performed according to center experience and the patient's risk status, but conservative treatment or

Correspondence: Doğan Erdoğan, M.D. Department of General Surgery, University of Health Sciences Turkiye, Haydarpasa Numune Training and Research Hospital, Istanbul, Turkiye
Phone: +90 216 545 59 85 **E-mail:** drderdogan@hotmail.com
Submitted Date: 11.04.2022 **Revised Date:** 11.04.2022 **Accepted Date:** 06.08.2022

percutaneous cholecystostomy becomes a priority[4-6]. It is thought that perioperative morbidity and mortality rates of surgery performed in patients with high surgical risk with comorbidities may also be high[7-8]. PC can be safely applied to patients with grade 2–3 acute cholecystitis, both therapeutically and preoperatively[1-9].

Our aim in this study is to investigate the efficacy and safety of PC, ACC recurrence rates, the need for repetition of PC, and the need for surgical treatment in grade 3 patients with high surgical risk.

Materials and Methods

The data of patients with percutaneous cholecystostomy who applied to Haydarpaşa Numune Training and Research Hospital between December 2012 and February 2020 were retrospectively determined by screening the hospital registry system, with the approval of the Ethics Committee (No: HNEAH-KAEK 2021/KK/196). Our study was conducted in accordance with the Declaration of Helsinki. Twenty patients were identified by evaluating follow-up information, laboratory, and imaging findings. Grade 3 high-risk acute calculous cholecystitis cases diagnosed with acute cholecystitis based on Tokyo 2018 criteria and treated with percutaneous cholecystostomy were included in the study. Patients diagnosed with biliary or biliary tract malignancy were excluded from the study.

Abdominal ultrasound (US) was performed for all patients at the time of admission. Computed tomography (CT) and magnetic resonance imaging (MRI) were requested when deemed necessary according to the clinical condition and laboratory follow-up of the patients. All patients were hospitalized after diagnosis with clinical follow-up, oral food intake was discontinued until their clinical findings regressed, and empirical intravenous antibiotics and fluid therapy were started. Before the procedure, complete blood count (CBC), biochemistry, and bleeding parameters were checked. The PC procedure was performed under local anesthesia, with the addition of analgesia, and an 8–10 Fr catheter was inserted into the gallbladder via the Seldinger method, using US and fluoroscopy-guided via transhepatic or transperitoneal route. The sterile material taken during the procedure was sent to microbiology for culture and antibiogram. The patients were followed up clinically and with US, CT, and MRI if necessary. The data were recorded as follows: the complaints of the patients, when they started, comorbidity, length of stay, ASA score, leukocyte and CRP values at the time of admission and after the procedure, complications related to the PC procedure, the microbial growth of the sample sent for culture, IV antibiotics, the route of the PC catheter placement, recurrent ACC attack, and the need for cholecystectomy in the follow-up were recorded.

Statistical Analysis

SPSS (Statistical Package for the Social Sciences) 23.0 package program was used in the statistical analysis of the data. Categorical measurements were summarized as numbers and percentages, and continuous measurements were summarized as mean (median and minimum–maximum where necessary). The Chi-square test was used in the analysis of categorical expressions.

Results

Twenty ACC patients, who were scored as grade 3 according to Tokyo 2018 criteria, underwent the PC procedure. Eight (40.0%) of the patients were female, and 12 (60.0%) were male. The mean age of the patients was 78.6±9.9. The mean hospital stay was 17.8±11.8. Technically, the success of the PC procedure was 100%, and a catheter was inserted with the Seldinger technique in all patients under US guidance, and no complications developed. The mean duration of the catheter was 29.0±14.7 days. All of the patients complained of abdominal pain, and it was mostly localized in the right upper quadrant with a rate of 80%. No procedure-related mortality was observed. The mean time between the onset of symptoms and admission to the hospital was 3 (2–4) days. The comorbidity of the patients was 100%, and all of them had more than one comorbidity. All of the patients were grade 3 according to the Tokyo severity rating. All of the patients were evaluated as ASA IV due to comorbidities, and they were found to be at high risk for surgery. (Table 1-3)

Table 1. Demographic Data

Variable	Frequency (n)	Percent (%)
Total Patients	20	-
Age	78.6±9.9	-
Gender		
Female	8	40
Male	12	60
ASA Score		
4	20	100
Symptoms		
Right upper quadrant pain	16	80
Epigastric pain	2	10
Diffuse abdominal pain	5	25
Jaundice	1	5
Tokyo Severity Grade		
3	20	100

Table 2. Distribution of Comorbidity

Comorbidities	Frequency (n)	Percent (%)
Hypertension	6	30
Diabetes Mellitus	7	35
Coronary Artery Disease	5	25
Congestive Heart Failure	5	15
Chronic Renal Failure	3	15
Acute Renal Failure	9	45
Cerebrovascular Disease	6	30
Chronic Obstructive Pulmonary Disease	3	15
Arrhythmia	3	15
Asthma	5	25
Pneumonia	4	20
Alzheimer's Disease	2	10
Other	16	80

Table 3. Distribution of General Characteristics (Characteristics of Lab Values)

Variable	Mean±SD
ALT (U/L)	56.60±64.96
AST (U/L)	51.35±48.18
GGT (U/L)	67.58±41.20
ALP (U/L)	149.67±132.75
T. Bilirubin (mg/dL)	1.97±2.39
D. Bilirubin (mg/dL)	1.36±2.37
White Blood Count (Pre-PC) (cells/mm^3)	14956.00±6240.81
White Blood Count (Post-PC) (cells/mm^3)	8856.50±2849.64
CRP (Pre-PC) (mg/L)	17.74±10.30
CRP (Post-PC) (mg/L)	5.55±8.21

Table 4. The Characteristics of Microbial Growth in Biliary Fluid Culture

Microorganism	Frequency (n)	Percent (%)
Total Microorganism Growth	6	30
E. coli	3	15
Enterococcus faecium	1	5
Klebsiella pneumoniae	2	10

While the average antibiotic use before PC was 2 (2–4) days, the post-procedure antibiotics' duration of use was 12 (7–17) days. The PC procedure was performed in 13 (65%) patients via the transhepatic route, and 7 patients (35%) via the transperitoneal route. Abdominal US was performed in all patients during hospitalization, and control ultrasonography was performed in 7 patients. 65% of patients required CT of the entire abdomen, and 3 (15%) patients required MR imaging. Percutaneous transhepatic cholangiography was performed in 3 (15%) patients, and choledocholithiasis was detected in 1 patient and ERCP was performed. The characteristic of the drained fluid during the PC procedure was biliary fluid in 16 (80%), purulent in 3 (15%) patients, and serous in 1 (5%) patient. In the culture taken during the PC procedure, microbial growth was observed in 6 (30%) patients. The organism was detected, and antibiotic changes were made. Reproducing microorganisms were *E. coli* in 3 patients, Klebsiella pneumoniae in 2 patients, and Enterococcus faecium in 1 patient. The most commonly used antibiotic was the combination of ceftriaxone + metronidazole in 5 (25%) patients. (Table 4)

Only one patient underwent open cholecystectomy directly 32 days later. Other patients received medical treatment and clinical follow-up. The PC was repeated in 1 (5%) patient due to the development of catheter dislocation. Bile leakage into the peritoneum was observed in one patient during the procedure. Acute cholecystitis attack did not recur in any of the patients in the follow-ups. Three (15%) patients died in the follow-ups.

There was no relationship between culture growth and duration of hospital stay. There was no relationship between the character of the fluid taken during PC and the microbial growth in culture. In addition, there was no relationship between the purulent character of the PC fluid sample and CRP and leukocytosis values, and their values were not higher than the other group.

Discussion

Surgery, and especially laparoscopic cholecystectomy (LC) in the treatment of acute calculous cholecystitis (ACC), is the most appropriate treatment currently accepted[8]. The majority of ACC cases are elderly patients and patients with high surgical risk. The disease progresses more severely in these patients compared to younger ones. As patient age and surgical risk increase, the tendency for non-surgical treatment is also becoming more popular[9]. There is a significant difference in morbidity and mortality between elective surgery and emergency surgery of ACC[10]. In a prospective study, when patients who underwent elective and emergency cholecystectomy were compared, mortality rates were less than 1% in elective cholecystectomy compared to 19% in emergency cholecystectomy, and the morbidity rates differed with 28% in elective to 66% in emergent cholecystectomy[11]. This suggests that in elderly and high-risk surgical patients, percutaneous cholecystostomy (PC) may delay surgery need in emergent conditions and act as an intermediate step until elective surgery[12]. PC takes the local findings and inflammatory

response under control[2]. The clinical success after PC can be evaluated by the decrease in fever and pain, decrease in the leukocyte count[13]. The clinical success of PC varies between 57% and 100% in the studies performed. In a systematic review which included 1918 patients, it was reported to be 86% on average[13,14]. In our study, this rate was calculated as 95%. The technique-related mortality rate of the PC procedure is quite low, and it has been reported generally below 1% in studies[15-17]. However, the average 30-day mortality rate of PC is 15.4%, which is statistically significantly higher than the average 4.5% reported in the emergent cholecystectomy procedure[13]. In our study, no procedure-related mortality was observed. Our one-month mortality rate was determined as 15%. This high mortality rate was attributed to the nature of our patients' comorbidities since this procedure was applied to patients with high morbidity and mortality risks.

Since the pathology causing acute calculous cholecystitis (ACC) does not disappear after percutaneous cholecystostomy (PC) procedure, biliary stone-related symptoms may recur, and PC provides only a temporary solution[8]. In the study of Winbladh et al.[14], it was stated that up to 40% of patients who underwent PC had to undergo elective cholecystectomy. On the other hand, 4.5% of the patients underwent emergent cholecystectomy for reasons related to failure of treatment, recurrent cholecystitis, or PC complications. In our study, 1 (5%) of the patients underwent elective cholecystectomy and no postoperative complication developed. None of our patients needed emergent cholecystectomy.

Catheter dislocation is one of the most common complications, although it is less than 10%; in some publications, it increases up to 20%[18-20]. In our study, catheter revision was performed in 1 patient due to catheter dislocation. No additional problem has developed. Other complications such as hemorrhage, biliary peritonitis, pneumothorax, secondary infection, and sepsis related to the PC procedure have also been reported at low rates[21].

In a prospective randomized study comparing percutaneous cholecystostomy (PC) and laparoscopic cholecystectomy (LC), patients with an Acute Physiology and Chronic Health Assessment (APACHE II) score between 7 and 14 were included. The rate of major complications, reintervention, and recurrent biliary disease were found to be significantly higher in the PC group. There was no statistically significant difference between mortality rates[8]. However, it was stated in this study as a pre-acceptance that those with higher risk, with an APACHE II score >14, should undergo PC. There is also a large-scale review that supports these findings and states that the results of PC are not as good when compared to LC[13]. Dikshit et al.[22] recommended follow-up with PC without cholecystectomy in gallbladder perforations. We think that PC can be followed without cholecystectomy in high-risk patients. Marziali et al.[23], in their study, stated that PC can be applied effectively and safely in elderly and high surgical risk acute calculous cholecystitis (ACC) patients and can be a permanent treatment without cholecystectomy. Similarly, in our study, we found that PC can be used safely and therapeutically in patients with high surgical risk. In addition, there is a general tendency not to perform early cholecystectomy in centers with less LC experience[24,25]. These results show us that PC can be used for patients with high surgical risk of PC for treatment purposes and to save time for emergency cholecystectomy in centers with less experience of emergency cholecystectomy.

Limitations

The limitations of our study are its retrospective nature and the small number of patients. It may be useful to perform percutaneous cholecystostomy (PC) in a higher number of patients with acute calculous cholecystitis (ACC) who have high surgical risk and to evaluate its therapeutic efficacy.

Conclusion

Percutaneous cholecystostomy (PC) can be an effective and safe treatment method that can be applied before cholecystectomy as an intermediate step or for permanent treatment to avoid mortality and morbidity in high-risk patients who are not suitable for surgery.

Ethics Committee Approval: The data of patients with percutaneous cholecystostomy who applied to Haydarpaşa Numune Training and Research Hospital between December 2012 and February 2020 were retrospectively determined by screening the hospital registry system, with the approval of the Ethics Committee (No: HNEAH-KAEK 2021/KK/196).

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

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

References

1. Yamashita Y, Takada T, Strasberg SM, Pitt HA, Gouma DJ, Garden OJ, et al. TG13 surgical management of acute cholecystitis. J Hepatobiliary Pancreat Sci 2013;20:89–96. [CrossRef]

2. Griniatsos J, Petrou A, Pappas P, Revenas K, Karavokyros I, Michail OP, et al. Percutaneous cholecystostomy without interval cholecystectomy as definitive treatment of acute cholecystitis in elderly and critically ill patients. South Med J 2008;101:586–90. [CrossRef]
3. Kiriyama S, Kozaka K, Takada T, Strasberg SM, Pitt HA, Gabata T, et al. Tokyo Guidelines 2018: Diagnostic criteria and severity grading of acute cholangitis (with videos). J Hepatobiliary Pancreat Sci 2018;25:17–30. [CrossRef]
4. Mori Y, Itoi T, Baron TH, Takada T, Strasberg SM, Pitt HA, et al. Tokyo Guidelines 2018: Management strategies for gallbladder drainage in patients with acute cholecystitis (with videos). J Hepatobiliary Pancreat Sci 2018;25:87–95. [CrossRef]
5. Yokoe M, Takada T, Strasberg SM, Solomkin JS, Mayumi T, Gomi H, et al. TG13 diagnostic criteria and severity grading of acute cholecystitis (with videos). J Hepatobiliary Pancreat Sci 2013;20:35–46. [CrossRef]
6. Okamoto K, Suzuki K, Takada T, Strasberg SM, Asbun HJ, Endo I, et al. Tokyo Guidelines 2018: Flowchart for the management of acute cholecystitis. J Hepatobiliary Pancreat Sci 2018;25:55–72.
7. McGillicuddy EA, Schuster KM, Barre K, Suarez L, Hall MR, Kaml GJ, et al. Non-operative management of acute cholecystitis in the elderly. Br J Surg 2012;99:1254–61. [CrossRef]
8. Loozen CS, van Santvoort HC, van Duijvendijk P, Besselink MG, Gouma DJ, Nieuwenhuijzen GA, et al. Laparoscopic cholecystectomy versus percutaneous catheter drainage for acute cholecystitis in high risk patients (CHOCOLATE): Multicentre randomised clinical trial. BMJ 2018;363:k3965.
9. Yokoe M, Hata J, Takada T, Strasberg SM, Asbun HJ, Wakabayashi G, et al. Tokyo Guidelines 2018: Diagnostic criteria and severity grading of acute cholecystitis (with videos). J Hepatobiliary Pancreat Sci 2018;25:41–54. [CrossRef]
10. Bergman S, Sourial N, Vedel I, Hanna WC, Fraser SA, Newman D, et al. Gallstone disease in the elderly: Are older patients managed differently? Surg Endosc 2011;25:55–61. [CrossRef]
11. Donati A, Ruzzi M, Adrario E, Pelaia P, Coluzzi F, Gabbanelli V, et al. A new and feasible model for predicting operative risk. Br J Anaesth 2004;93:393–9. [CrossRef]
12. Houghton PW, Jenkinson LR, Donaldson LA. Cholecystectomy in the elderly: A prospective study. Br J Surg 1985;72:220–2.
13. Peters R, Kolderman S, Peters B, Simoens M, Braak S. Percutaneous cholecystostomy: Single centre experience in 111 patients with an acute cholecystitis. JBR-BTR 2014;97:197–201. [CrossRef]
14. Winbladh A, Gullstrand P, Svanvik J, Sandström P. Systematic review of cholecystostomy as a treatment option in acute cholecystitis. HPB (Oxford) 2009;11:183–93. [CrossRef]
15. Akyürek N, Salman B, Yüksel O, Tezcaner T, Irkörücü O, Yücel C, et al. Management of acute calculous cholecystitis in high-risk patients: Percutaneous cholecystotomy followed by early laparoscopic cholecystectomy. Surg Laparosc Endosc Percutan Tech 2005;15:315–20. [CrossRef]
16. Tseng LJ, Tsai CC, Mo LR, Lin RC, Kuo JY, Chang KK, et al. Palliative percutaneous transhepatic gallbladder drainage of gallbladder empyema before laparoscopic cholecystectomy. Hepatogastroenterology 2000;47:932–6.
17. Melin MM, Sarr MG, Bender CE, van Heerden JA. Percutaneous cholecystostomy: A valuable technique in high-risk patients with presumed acute cholecystitis. Br J Surg 1995;82:1274–7.
18. Ito K, Fujita N, Noda Y, Kobayashi G, Kimura K, Sugawara T, et al. Percutaneous cholecystostomy versus gallbladder aspiration for acute cholecystitis: A prospective randomized controlled trial. AJR Am J Roentgenol 2004;183:193–6. [CrossRef]
19. Granlund A, Karlson BM, Elvin A, Rasmussen I. Ultrasound-guided percutaneous cholecystostomy in high-risk surgical patients. Langenbecks Arch Surg 2001;386:212–7. [CrossRef]
20. Berber E, Engle KL, String A, Garland AM, Chang G, Macho J, et al. Selective use of tube cholecystostomy with interval laparoscopic cholecystectomy in acute cholecystitis. Arch Surg 2000;135:341–6. [CrossRef]
21. Akhan O, Akinci D, Ozmen MN. Percutaneous cholecystostomy. Eur J Radiol 2002;43:229–36. [CrossRef]
22. Dikshit V, Gupta R, Kothari P, Gupta A, Kamble R, Kesan K. Conservative management of type 2 gallbladder perforation in a child. World J Clin Cases 2015;3:671–4. [CrossRef]
23. Marziali I, Cicconi S, Marilungo F, Benedetti M, Ciano P, Pagano P, et al. Role of percutaneous cholecystostomy in all-comers with acute cholecystitis according to current guidelines in a general surgical unit. Updates Surg 2021;73:473–80. [CrossRef]
24. Kortram K, van Ramshorst B, Bollen TL, Besselink MG, Gouma DJ, Karsten T, et al. Acute cholecystitis in high risk surgical patients: Percutaneous cholecystostomy versus laparoscopic cholecystectomy (CHOCOLATE trial): Study protocol for a randomized controlled trial. Trials 2012;13:7. [CrossRef]
25. Strasberg SM. Clinical practice. Acute calculous cholecystitis. N Engl J Med 2008;358:2804–11. [CrossRef]