Loja Medical Journal. 2026;1(1):25-38
Medical College of Loja. January-June 2026
DOI: pending

ORIGINAL

# Percutaneous Cholecystostomy as a Temporizing Treatment in Severe Acute Cholecystitis: When Should It Be Indicated?

## Colecistostomía percutánea como tratamiento contemporizador en colecistitis aguda grave: ¿cuándo indicarla?

## Colecistostomia percutânea como tratamento temporizador na colecistite aguda grave: quando indicá-la?

**Augusto Prado Falconí**[1]; **Varinia Merino Garnica**[2]

[1]Specialist in General Surgery and Colorectal Surgery, Hospital Manuel Ygnacio Monteros, Loja, Ecuador.
[2]Specialist in Family and Community Medicine, Clínica Medilab, Loja, Ecuador.

**Suggested citation:** Prado Falconí A, Merino Garnica V. Percutaneous cholecystostomy as temporizing treatment in severe acute cholecystitis: when should it be indicated? Rev Méd Loja. 2026;1(1):25-38.

**Received:** 04-03-2026 **Accepted:** 10-04-2026 **Published:** 22-04-2026

**Editor:** Dr. Miguel David Alvarez

**Corresponding author:** Augusto Prado Falconi

**ABSTRACT**

This study addresses percutaneous cholecystostomy as a treatment for severe acute cholecystitis. This technique involves draining the contents of the inflamed gallbladder through a needle guided by ultrasound or computed tomography imaging. It is mainly used in patients with high surgical risk or severe complications. Percutaneous cholecystostomy has evolved with advances in imaging techniques, assistive devices, stent placement, antibiotic use, and assessment of procedural success. It offers advantages such as a lower complication rate and faster recovery compared with open surgery. The success rate ranges from 70% to 90% and has been associated with decreased mortality and a lower risk of complications. In summary, percutaneous cholecystostomy is an effective and safe option as a temporizing treatment for severe acute cholecystitis in patients at high surgical risk.

**Keywords:** cholecystostomy, drainage, percutaneous, cholecystitis.

**RESUMEN**

La presente investigación aborda el tema de la Colecistostomía percutánea como tratamiento para la colecistitis aguda grave. Esta técnica consiste en drenar el contenido de la vesícula biliar inflamada a través de una aguja guiada por imágenes de ultrasonido o tomografía computarizada. Se utiliza principalmente en pacientes con alto riesgo quirúrgico o complicaciones graves. La Colecistostomía percutánea ha evolucionado con avances en técnicas de imagen, dispositivos de asistencia, colocación de stent, uso de antibióticos y evaluación del éxito del procedimiento. Ofrece ventajas como una menor tasa de complicaciones y una recuperación más rápida en comparación con la cirugía abierta. La tasa de éxito varía entre el 70 % y el 90 %, y se ha asociado con una disminución de la mortalidad y un menor riesgo de complicaciones. En resumen, la Colecistostomía percutánea es una opción efectiva y segura como tratamiento contemporizador para tratar la colecistitis aguda grave en pacientes de alto riesgo quirúrgico.

**Palabras clave:** colecistostomía, drenaje, percutáneo, colecistitis.

**RESUMO**

A presente pesquisa aborda a colecistostomia percutânea como tratamento para a colecistite aguda grave. Essa técnica consiste em drenar o conteúdo da vesícula biliar inflamada por meio de uma agulha guiada por imagens de ultrassonografia ou tomografia computadorizada. É utilizada principalmente em pacientes com alto risco cirúrgico ou complicações graves. A colecistostomia percutânea evoluiu com os avanços nas técnicas de imagem, dispositivos de assistência, colocação de stent, uso de antibióticos e avaliação do sucesso do procedimento. Oferece vantagens como menor taxa de complicações e recuperação mais rápida em comparação com a cirurgia aberta. A taxa de sucesso varia entre 70% e 90% e tem sido associada à redução da mortalidade e a menor risco de complicações. Em resumo, a colecistostomia percutânea é uma opção eficaz e segura como tratamento temporizador para a colecistite aguda grave em pacientes com alto risco cirúrgico.

**Palavras-chave:** colecistostomia, drenagem, percutânea, colecistite.

## INTRODUCTION

Acute cholecystitis is an inflammation of the gallbladder that may range from mild to severe and may be complicated by the presence of gallstones, bile duct obstruction, or infection.[1,2] The treatment of cholecystitis depends on its severity and the presence of complications; available alternatives include medical treatment, laparoscopic cholecystectomy, which is considered the gold standard, and percutaneous cholecystostomy.[3]

In severe cases of acute cholecystitis, particularly in patients with complications or those considered to be at high surgical risk, percutaneous cholecystostomy has become a viable and effective therapeutic option.[4] Percutaneous cholecystostomy consists of the insertion of a needle under ultrasound or computed tomography image guidance to drain the contents of the inflamed gallbladder and relieve symptoms.[5] This technique has been used worldwide for several decades and has been shown to be safe and effective in resolving severe acute cholecystitis in selected patients.

### Epidemiology and Etiology

Acute cholecystitis is a common disease that affects a large number of patients worldwide, with an estimated frequency of 10% to 15%.[6] The incidence of acute cholecystitis in the United States is estimated to be approximately 10 to 20 cases per 10,000 persons per year, affecting women more frequently than men and occurring more commonly in individuals over 50 years of age. In Latin America, the prevalence of acute cholecystitis is similar and is estimated to account for 7% to 10% of hospitalizations due to gastrointestinal diseases.

The etiology of acute cholecystitis is mainly related to obstruction of the biliary tract by gallstones, tumors, strictures, among other causes. Gallstones are the most common cause of acute cholecystitis, accounting for approximately 90% of cases.[7] Acute inflammation occurs when gallstones obstruct the gallbladder neck or cystic duct, leading to gallbladder distension and inflammation. It may also be caused by bacterial infections, ischemia, or abdominal trauma.

### Classification and Diagnosis

The diagnosis of cholecystitis is made through a combination of clinical history, physical examination, and diagnostic tests.[2] Patients with acute cholecystitis may present with severe abdominal pain in the right upper quadrant, nausea, vomiting, fever, and chills. They may also experience pain in the right shoulder or upper back. Physical examination may reveal tenderness in the right upper quadrant and sensitivity in the liver area.[8,9]

Diagnostic tests include blood tests to assess signs of inflammation and liver function, as well as imaging studies such as abdominal ultrasound and computed tomography (CT).[3] Abdominal ultrasound is the most commonly used initial diagnostic test for cholecystitis and may show the presence of gallstones and inflammation of the gallbladder.[10] Abdominal CT may also be useful for diagnosing acute cholecystitis and may be particularly valuable for identifying complications such as gallbladder perforation.[7]

According to the Tokyo Guidelines 2018, acute cholecystitis is classified as

Grade I (mild), Grade II (moderate), and Grade III (severe) (Table 1).

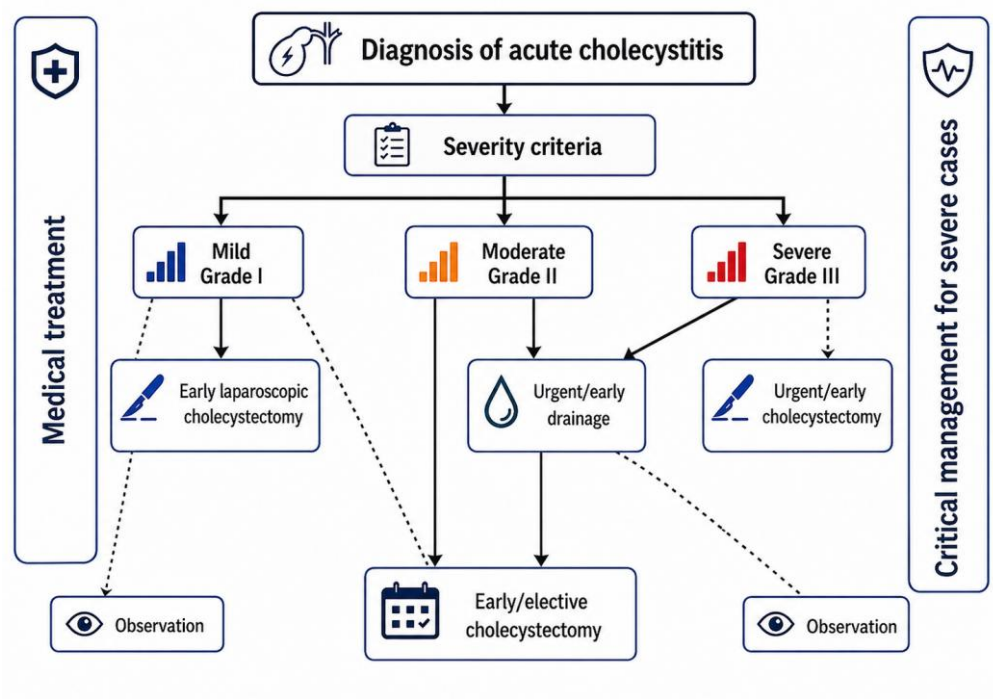
**Table 1. Severity classification and suggested treatment of severe acute cholecystitis in selected patients.**

| Criteria | Treatment |
|---|---|
| **Grade I (mild) Does not meet criteria for Grade II or III.** | Laparoscopic cholecystectomy. |
| **Grade II (moderate) At least one of the following:**<br>• **White blood cell count >18,000/mm$^3$.**<br>• **Tender palpable mass in the right hypochondrium.**<br>• **Duration of symptoms >72 h.**<br>• **Marked local inflammation, such as gangrene, emphysema, pericholecystic or hepatic abscess, or biliary peritonitis.** | Laparoscopic cholecystectomy, in experienced centers, or percutaneous drainage. |
| **Grade III (severe) At least one of the following:**<br>• **Cardiovascular dysfunction: hypotension requiring vasopressors, such as dopamine or norepinephrine.**<br>• **Neurological dysfunction: altered mental status.**<br>• **Respiratory dysfunction: $PaO_2/FiO_2$ <300.**<br>• **Renal dysfunction: oliguria or creatinine >2 mg/dL.**<br>• **Hepatic dysfunction: INR >1.5.**<br>• **Hematological dysfunction: platelet count <100,000/mm$^3$.** | Percutaneous cholecystostomy. |

*Note. Adapted from Yegros Ortiz et al.(10)*

**Management of Biliary Tract Infection/Inflammation**

Algorithm 1. Management of biliary tract infection/inflammation




*Note. Adapted from Tsuyuguchi et al.(11)*

**Percutaneous Cholecystostomy**

Percutaneous cholecystostomy is a minimally invasive surgical technique used mainly in patients with severe acute cholecystitis who are not candidates for emergency surgery.[12] Some of the most common indications for percutaneous cholecystostomy are:

Indications:

- Patients at high surgical risk: Laparoscopic cholecystectomy is the treatment of choice for acute cholecystitis; however, some patients may be at high surgical risk due to advanced age, the presence of severe comorbidities such as heart failure or chronic obstructive pulmonary disease, obesity, or even hemodynamic instability.[4]
- Uncomplicated severe acute cholecystitis: In patients with uncomplicated severe acute cholecystitis, percutaneous cholecystostomy may be an option to relieve symptoms and prevent progression to a more severe form of the disease. This also applies to patients who have undergone previous abdominal surgery; in these cases, percutaneous cholecystostomy may serve as a temporary treatment, followed by delayed laparoscopic cholecystectomy.[7]
- Complicated severe acute cholecystitis: In patients with complicated severe acute cholecystitis, such as gangrenous cholecystitis or gallbladder perforation, percutaneous cholecystostomy may be a treatment option to relieve symptoms and prevent serious complications, such as sepsis.[13]

- Patients with multiple organ failure: In patients with multiple organ failure, percutaneous cholecystostomy may be an option to relieve symptoms and prevent serious complications while the functions of the affected organs are stabilized.[14]

**Evolution and Advances in Percutaneous Cholecystostomy**

Percutaneous cholecystostomy has evolved significantly in recent decades as a safe and effective alternative to surgical treatment for acute cholecystitis in patients who are not candidates for immediate surgery or who are at high surgical risk.[4] Among the latest advances in this procedure, the following stand out:

- Image-guided techniques: The use of imaging techniques, such as ultrasound, computed tomography, and fluoroscopy, has allowed greater accuracy in identifying the gallbladder and selecting the best site for percutaneous puncture, significantly reducing the number of complications and the procedural failure rate.[15]
- Use of assistive devices: The introduction of assistive devices, such as guide catheters and dilation systems, has improved access to the gallbladder and increased the effectiveness of percutaneous cholecystostomy in patients with difficult anatomy.[12]
- Improvements in stent placement technique: Biliary stent placement during percutaneous cholecystostomy has become a common practice in many medical centers, allowing continuous gallbladder drainage and preventing complications such as catheter obstruction.
- Prophylactic antibiotic therapy: The use of antibiotic prophylaxis in percutaneous cholecystostomy has been shown to be effective in reducing the rate of gallbladder infection and decreasing the risk of complications.[12]
- Assessment of procedural success: The use of clinical, biochemical, and imaging criteria to assess the success of percutaneous cholecystostomy has allowed better patient selection and greater procedural effectiveness.[16]

In summary, percutaneous cholecystostomy has evolved significantly in recent years due to the introduction of new imaging techniques, assistive devices, improvements in stent placement techniques, the use of antibiotic prophylaxis, and the assessment of procedural success.[17] These advances have improved the efficacy and safety of this treatment for acute cholecystitis in patients at high surgical risk.

Among the different techniques used to perform percutaneous cholecystostomy, the most commonly used is the modified Seldinger technique.[15]

1. Placement of the patient in the supine position under local anesthesia.
2. Ultrasound identification of the gallbladder and localization of the puncture site using a special needle.
3. Percutaneous insertion of the needle into the gallbladder through the skin and abdominal muscle.
4. Injection of a radiopaque contrast agent to confirm the position of the needle and the patency of the common bile duct.
5. Introduction of a guidewire through the needle and insertion of the drainage catheter over the wire.
6. Removal of the guidewire and fixation of the catheter to the abdominal wall.

7. Radiological control to ensure that the catheter is in the proper position.
8. Connection of the catheter to an external drainage system to allow bile drainage.

The percutaneous cholecystostomy technique has several advantages over emergency surgery, including a lower complication rate and faster recovery. However, percutaneous cholecystostomy is not suitable for all patients and should be evaluated on a case-by-case basis.[7]

**Resultados y pronóstico**

La colecistostomía percutánea es una técnica mínimamente invasiva que se ha utilizado cada vez más en el tratamiento de la colecistitis aguda grave. En comparación con la cirugía abierta, la colecistostomía percutánea ofrece una recuperación más rápida, una estancia hospitalaria más corta y una menor tasa de complicaciones.[16]

La tasa de éxito de la colecistostomía percutánea varía entre el 70 % y el 90 %, dependiendo del grado de inflamación de la vesícula biliar y la gravedad de la enfermedad. En algunos casos, puede ser necesaria una segunda intervención o la conversión a una cirugía abierta.[17]

La colecistostomía percutánea también se ha asociado con una disminución de la mortalidad en pacientes con colecistitis aguda grave y un menor riesgo de complicaciones, como la lesión de la vía biliar y la infección de la herida quirúrgica.[18]

En cuanto al pronóstico, la colecistostomía percutánea se ha asociado con una tasa de mortalidad en torno al 5 % en pacientes con colecistitis aguda grave. La mayoría de los pacientes tratados con colecistostomía percutánea experimentan una mejora significativa de los síntomas en los primeros días después de la intervención y pueden regresar a sus actividades normales en un periodo relativamente corto.[4]

## MATERIALS AND METHODS

An observational, descriptive, cross-sectional, retrospective study was conducted. A non-probability sampling method was used. All patients treated at Hospital General Manuel Ygnacio Monteros in Loja, Ecuador, during the 2019–2023 period and registered in the AS-400 system with the following diagnoses coded according to the ICD-10 classification were analyzed:

- K800 Gallstone of gallbladder with acute cholecystitis
- K801 Gallstone of gallbladder with other cholecystitis
- K802 Gallstone of gallbladder without cholecystitis
- K803 Calculus of bile duct with cholangitis
- K805 Calculus of bile duct without cholangitis or cholecystitis
- K808 Other cholelithiasis
- K810 Acute cholecystitis
- K819 Cholecystitis, unspecified
- K829 Disease of gallbladder, unspecified
- K830 Cholangitis
- K839 Disease of biliary tract, unspecified
- K850 Acute idiopathic pancreatitis

A total of 508 cases with these diagnoses were analyzed. Subsequently, each medical record was reviewed, and those in which percutaneous cholecystostomy was performed in the imaging department or in the intensive care unit, either ultrasound-guided or CT-guided, were selected according to the following table:

**Tabla 2. Diagnósticos relacionados con patología biliar y casos encontrados en los cuales se realizó colecistostomía percutánea**.

| Year | Patients with biliary tract disease | Patients who underwent percutaneous cholecystostomy at Hospital General Manuel Ygnacio Monteros |
|---|---|---|
| **2019** | 233 | 4 |
| **2020** | 63 | 6 |
| **2021** | 86 | 7 |
| **2022** | 104 | 5 |
| **2023** | 22 | 2 |

*Prepared by: Prado Falconí, Augusto Yamil.*

**Inclusion Criteria**

Patients who underwent percutaneous cholecystostomy during their hospital stay, either in the imaging department or in the intensive care unit. The procedure was performed by specialists in general surgery.

**Exclusion Criteria**

Patients who underwent cholecystostomy in the operating room, patients who did not undergo cholecystostomy, or patients in whom the procedure was performed at another healthcare institution were excluded.

The sample was characterized according to demographic variables such as age and sex, comorbidities, disease progression time, clinical status of the patient, type of percutaneous drainage, whether ultrasound-guided or CT-guided, hospital stay location, either hospitalization ward or intensive care unit, clinical improvement, subsequent surgery, and drainage-related complications, including bile leakage, intestinal perforation, catheter dislodgement, laparoscopy due to failure, among others.

Approval for data collection was requested from the administration of Hospital General Manuel Ygnacio Monteros. Subsequently, the request was referred to the information technology department, which provided the data through a report in a Microsoft Excel spreadsheet, where each medical record was analyzed.

**Limitations**

The main limitations identified were lack of patient follow-up, mainly because some patients did not return for subsequent outpatient follow-up visits; incomplete data in the medical records; inadequate documentation of the procedure, namely percutaneous cholecystostomy; and unavailability of the CT scanner due to malfunction for four years.

## RESULTS AND DISCUSSION

**Table 3. Characterization of the sample according to age and sex**

| Coding | Age | Sex |
|---|---|---|
| **Patient 1** | 46 | Female |
| **Patient 2** | 57 | Female |
| **Patient 3** | 70 | Female |
| **Patient 4** | 29 | Male |
| **Patient 5** | 50 | Female |
| **Patient 6** | 63 | Female |
| **Patient 7** | 60 | Female |
| **Patient 8** | 78 | Female |
| **Patient 9** | 64 | Male |
| **Patient 10** | 49 | Male |
| **Patient 11** | 89 | Female |
| **Patient 12** | 67 | Female |
| **Patient 13** | 51 | Male |
| **Patient 15** | 68 | Female |
| **Patient 16** | 39 | Male |
| **Patient 17** | 34 | Female |
| **Patient 18** | 94 | Male |
| **Patient 19** | 70 | Male |
| **Patient 20** | 47 | Male |
| **Patient 21** | 59 | Female |
| **Patient 22** | 63 | Female |
| **Patient 23** | 63 | Female |
| **Patient 24** | 51 | Male |

En In Table 3, a mean age of 59 years is observed, which is consistent with statistical data regarding the epidemiology of this condition, generally around 50 years of age. The mode was 63 years, and the median was 60 years. It is noteworthy that two young adults aged 29 and 34 years were identified, since these are not age groups in which this condition is frequently observed. A similar pattern was found regarding sex distribution: 14 of the patients were women, corresponding to 58.3%, while 10 were men, representing 41.6% of the study subjects.

**Table 4. Presence of comorbidities and clinical stage of cholecystitis**

| Coding | Comorbidities | Specification | Stage |
|---|---|---|---|
| **Patient 1** | Yes | Class II obesity Arterial hypertension | Grade II |
| **Patient 2** | Yes | Class I obesity | Grade III |
| **Patient 3** | Yes | Hypothyroidism Diabetes mellitus | Grade III |
| **Patient 4** | Yes | Class I obesity | Grade III |
| **Patient 5** | Yes | Diabetes mellitus | Grade III |
| **Patient 6** | Yes | Overweight Arterial hypertension Diabetes mellitus Dyslipidemia | Grade II |
| **Patient 7** | Yes | Overweight Hypothyroidism | Grade III |
| **Patient 8** | Yes | Class I obesity Arterial hypertension Diabetes mellitus | Grade II |
| **Patient 9** | Yes | Diabetes mellitus | Grade III |
| **Patient 10** | No | None | Grade III |
| **Patient 11** | Yes | Class II obesity Arterial hypertension | Grade III |

| | | | |
|---|---|---|---|
| **Patient 12** | Yes | Class I obesity Diabetes mellitus Dyslipidemia | Grade III |
| **Patient 13** | No | None | Grade III |
| **Patient 15** | Yes | Overweight COPD | Grade III |
| **Patient 16** | Yes | Class II obesity Arterial hypertension | Grade III |
| **Patient 17** | Yes | Class I obesity Hypothyroidism | Grade II |
| **Patient 18** | Yes | Diabetes mellitus | Grade III |
| **Patient 19** | Yes | Arterial hypertension | Grade III |
| **Patient 20** | No | None | Grade III |
| **Patient 21** | Yes | Arterial hypertension Ischemic stroke 4 years ago | Grade II |
| **Patient 22** | Yes | Class II obesity Arterial hypertension | Grade III |
| **Patient 23** | Yes | Overweight Diabetes mellitus | Grade III |
| **Patient 24** | No | None | Grade III |

In Table 4, it can be observed that only 17.3% of the study population had no comorbidities, whereas 82.7% of the patients did have at least one comorbidity. Therefore, in most of these cases, together with the clinical staging of cholecystitis, percutaneous cholecystostomy was chosen as the therapeutic approach.

**Table 5. Type of drainage according to imaging guidance modality**

| Type of procedure | CT-guided | Ultrasound-guided |
|---|---|---|
| Number of patients | 3 | 21 |

In Table 5, it can be observed that only 13% of percutaneous cholecystostomies were performed under computed tomography guidance, whereas 87% were performed under ultrasound guidance. This was mainly due to the fact that, during the 2019–2020 period, the institution's CT scanner malfunctioned and, up to the time of the study in 2023, had not been repaired or replaced. Therefore, the vast majority of procedures were performed under ultrasound guidance in conjunction with the imaging specialist.

**Table 6. Clinical improvement and/or subsequent surgery**

| Coding | Clinical improvement | Clinical improvement in days | Subsequent surgery |
|---|---|---|---|
| **Patient 1** | Yes | 2 | Yes |
| **Patient 2** | Yes | 4 | No data on subsequent surgery in the AS-400 system |
| **Patient 3** | Yes | 1 | Yes |
| **Patient 4** | No | - | No data on subsequent surgery in the AS-400 system |
| **Patient 5** | Yes | 2 | Yes |
| **Patient 6** | Yes | 1 | No data on subsequent surgery in the AS-400 system |
| **Patient 7** | Yes | 3 | Yes |
| **Patient 8** | Yes | 4 | Yes |
| **Patient 9** | Yes | 1 | No |
| **Patient 10** | Yes | 2 | No |
| **Patient 11** | Yes | 1 | Yes |
| **Patient 12** | Yes | 3 | No data on subsequent surgery in the AS-400 system |

| | | | |
|---|---|---|---|
| **Patient 13** | Yes | 4 | No data on subsequent surgery in the AS-400 system |
| **Patient 15** | Yes | 1 | Yes |
| **Patient 16** | Yes | 1 | Yes |
| **Patient 17** | Yes | 1 | Yes |
| **Patient 18** | Yes | 2 | No |
| **Patient 19** | Yes | 4 | Yes |
| **Patient 20** | Yes | 1 | Yes |
| **Patient 21** | Yes | 2 | No |
| **Patient 22** | Yes | 1 | No data on subsequent surgery in the AS-400 system |
| **Patient 23** | Yes | 3 | Yes |
| **Patient 24** | Yes | 2 | No |

Ninety-five percent of the patients showed clinical improvement after the procedure, with improvement occurring within 24 hours to 4 days, depending on the case. In only one case, no improvement was observed, as it was associated with intestinal perforation, which complicated the clinical course and subsequent evolution. Fifty-two percent of the patients subsequently underwent surgery, specifically laparoscopic cholecystectomy; 21% did not undergo surgery, and 26% had no subsequent records in the institution's system.

**Table 7. Complications**

| Coding | Presence of complications | Bile leakage | Intestinal perforation | Catheter dislodgement | Laparoscopy due to failure |
|---|---|---|---|---|---|
| **Patient 1** | No | | | | |
| **Patient 2** | Yes | | | X | |
| **Patient 3** | No | | | | |
| **Patient 4** | Yes | | X | | |
| **Patient 5** | No | | | | |
| **Patient 6** | No | | | | |
| **Patient 7** | Yes | X | | | X |
| **Patient 8** | No | | | | |
| **Patient 9** | No | | | | |
| **Patient 10** | No | | | | |
| **Patient 11** | No | | | | |
| **Patient 12** | No | | | | |
| **Patient 13** | Yes | X | | | |
| **Patient 15** | No | | | | |
| **Patient 16** | No | | | | |
| **Patient 17** | No | | | | |
| **Patient 18** | Yes | | | X | |

| | | | | | |
|---|---|---|---|---|---|
| **Patient 19** | No | | | | |
| **Patient 20** | No | | | | |
| **Patient 21** | No | | | | |
| **Patient 22** | No | | | | |
| **Patient 23** | Yes | X | | | X |
| **Patient 24** | No | | | | |

In Table 7, it can be observed that 73.9% of the procedures had no complications. Bile leakage occurred in 13% of cases; intestinal perforation occurred in only one procedure; catheter dislodgement was observed in 8.6%; and laparoscopic surgery due to procedural failure was required in 8.6% of cases. Based on these findings, percutaneous cholecystostomy can be considered a significantly safe procedure, although it is not performed frequently at the institution. Undoubtedly, a greater learning curve could help further reduce these already low complication rates.

## CONCLUSIONS

Percutaneous cholecystostomy is an effective and safe treatment for patients with severe acute cholecystitis who are not candidates for urgent surgery. The technique is less invasive than surgery and can be performed in patients at high surgical risk, such as those with severe cardiovascular, pulmonary, or renal disease. In addition, percutaneous cholecystostomy may be used as a bridge to elective surgery in patients with mild or moderate acute cholecystitis.

Studies have shown that the success rate of percutaneous cholecystostomy is high, with a significant reduction in symptoms and a decrease in complications. Furthermore, the technique is associated with a low mortality rate and a short hospital stay.

Despite its advantages, percutaneous cholecystostomy has some limitations, including the need for long-term follow-up, the risk of infection at the puncture site, and the possibility of catheter-related complications. Additionally, the technique is not indicated in all cases of acute cholecystitis and should be evaluated individually for each patient.

## REFERENCES

1. Viste A, Jensen D, Angelsen JH, Hoem D. Percutaneous cholecystostomy in acute cholecystitis; a retrospective analysis of a large series of 104 patients. BMC Surg. 2015;15:17. doi:10.1186/s12893-015-0002-8.

2. Kim SY, Yoo KS. Efficacy of preoperative percutaneous cholecystostomy in the management of acute cholecystitis according to severity grades. Korean J Intern Med. 2018;33(3):497-505. doi:10.3904/kjim.2016.209.

3. Hasbahceci M, Cengiz MB, Malya FU, Kunduz E, Memmi N. The impact of a percutaneous cholecystostomy catheter in situ until the time of cholecystectomy on the development of recurrent acute cholecystitis: a historical cohort study. Rev Esp Enferm Dig. 2018;110(10):629-633. doi:10.17235/reed.2018.5644/2018.

4. Tsuyuguchi T, Takada T, Kawarada Y, Nimura Y, Wada K, Nagino M, et al. Techniques of biliary drainage for acute cholecystitis: Tokyo Guidelines. J Hepatobiliary Pancreat Surg. 2007;14(1):46-51. doi:10.1007/s00534-006-1155-8.

5. Markopoulos G, Mulita F, Kehagias D, Tsochatzis S, Lampropoulos C, Kehagias I. Outcomes of percutaneous cholecystostomy in elderly patients: a systematic review and meta-analysis. Prz Gastroenterol. 2021;16(3):188-195. doi:10.5114/pg.2020.100658.

6. Gurusamy KS, Rossi M, Davidson BR. Percutaneous cholecystostomy for high-risk surgical patients with acute calculous cholecystitis. Cochrane Database Syst Rev. 2013;(8):CD007088. doi:10.1002/14651858.CD007088.pub2.

7. Miura F, Takada T, Kawarada Y, Nimura Y, Wada K, Hirota M, et al. Flowcharts for the diagnosis and treatment of acute cholangitis and cholecystitis: Tokyo Guidelines. J Hepatobiliary Pancreat Surg. 2007;14(1):27-34. doi:10.1007/s00534-006-1153-x.

8. Lin WC, Chang CW, Chu CH. Percutaneous cholecystostomy for acute cholecystitis in high-risk elderly patients. Kaohsiung J Med Sci. 2016;32(10):518-525. doi:10.1016/j.kjms.2016.08.006.

9. Al-Jundi W, Cannon T, Antakia R, Anoop U, Balamurugan R, Everitt N, et al. Percutaneous cholecystostomy as an alternative to cholecystectomy in high risk patients with biliary sepsis: a district general hospital experience. Ann R Coll Surg Engl. 2012;94(2):99-101. doi:10.1308/003588412X13171221501302.

10. Yegros Ortiz CD, Feltes Villalba SC, Duarte DB, Fretes Oviedo NE. Application of Tokyo criteria for the diagnosis of acute cholecystitis in the Adult Emergency Department of the Hospital Nacional, Itauguá. Rev Nac (Itauguá). 2021;13(1):31-40. doi:10.18004/rdn2021.jun.01.031.040.

11. Tsuyuguchi T, Takada T, Kawarada Y, Nimura Y, Wada K, Nagino M, et al. Techniques of biliary drainage for acute cholangitis: Tokyo Guidelines. J Hepatobiliary Pancreat Surg. 2007;14(1):35-45. doi:10.1007/s00534-006-1154-9.

12. Itoi T, Tsuyuguchi T, Takada T, Strasberg SM, Pitt HA, Kim MH, et al. TG13 indications and techniques for biliary drainage in acute cholangitis (with videos). J Hepatobiliary Pancreat Sci. 2013;20(1):71-80. doi:10.1007/s00534-012-0569-8.

13. Nassar A, Elshahat I, Forsyth K, Shaikh S, Ghazanfar M. Outcome of early cholecystectomy compared to percutaneous drainage of gallbladder and delayed cholecystectomy for patients with acute cholecystitis: systematic review and meta-analysis. HPB (Oxford). 2022;24(10):1622-1633. doi:10.1016/j.hpb.2022.04.010.

14. Hung YL, Sung CM, Fu CY, Liao CH, Wang SY, Hsu JT, et al. Management of patients with acute cholecystitis after percutaneous cholecystostomy: from the acute stage to definitive surgical treatment. Front Surg. 2021;8:616320. doi:10.3389/fsurg.2021.616320.

15. Sanjay P, Mittapalli D, Marioud A, White RD, Ram R, Alijani A. Clinical outcomes of a percutaneous cholecystostomy for acute cholecystitis: a multicentre analysis. HPB (Oxford). 2013;15(7):511-516. doi:10.1111/j.1477-2574.2012.00610.x.

16. Ramos Loza CM, Mendoza López Videla JN, Ponce Morales JA. Aplicación de la guía TOKIO en colecistitis aguda litiásica. Rev Méd La Paz. 2018;24(1):19-26.

17. 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(1):87-95. doi:10.1002/jhbp.504.

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(1):193-196. doi:10.2214/ajr.183.1.1830193.

## CONSENT

The author declares that no tests or experiments involving humans or animals were conducted during the course of this research.

## FUNDING

This research was self-funded.

## CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.

## AUTHOR CONTRIBUTIONS

Conceptualization: Augusto Prado, Varinia Merino.

Investigation: Augusto Prado, Varinia Merino.

Methodology: Augusto Prado, Varinia Merino.

Project administration: Augusto Prado, Varinia Merino.

Writing – original draft: Augusto Prado, Varinia Merino.

Writing – review and editing: Augusto Prado, Varinia Merino.