

# Percutaneous cholecystostomy in acute cholecystitis – Narrative review article

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## ABSTRACT

Percutaneous cholecystostomy is often performed to treat high-risk patients with acute cholecystitis who are not suitable for cholecystectomy. It is performed by the interventional radiologist and can be performed through the transhepatic or transperitoneal route (direct gallbladder puncture, without passing through the liver). Percutaneous cholecystostomy is used as a bridging procedure to stabilize high-risk patients with acute cholecystitis. We prepared this narrative review article to describe the indications for performing this procedure and the consequences of its performance and to compare it with emergency cholecystectomy.

**Key words:** Acute cholecystitis, Cholecystectomy, Conservative treatment of acute cholecystitis, Non-operative treatment of acute cholecystitis, Percutaneous cholecystostomy

Acute cholecystitis is a clinical condition most commonly caused by gallstones and is associated with symptoms of upper abdominal pain, nausea, and vomiting. Cholecystectomy is the treatment of choice for acute cholecystitis but for patients with high-risk factors such as increasing age, medical conditions such as heart disease, hypertension, and diabetes mellitus who are not candidates for surgery, percutaneous cholecystostomy can be used as a bridge to manage this condition [1-4]. Fig. 1, describes the flow chart of the management of acute cholecystitis.


The World Society of Emergency Surgery guidelines for the diagnosis and management of acute calculous cholecystitis have recommended percutaneous drainage of the gallbladder in patients who are not fit for surgery. It is a safe and effective treatment option for elderly and high-risk patients. Delayed cholecystectomy should be offered for patients who have recovered and to reduce their perioperative risk factors [5,6]. The Tokyo Guidelines for the Diagnostic Criteria and Severity Grading of Acute Cholecystitis state that grade 3 acute cholecystitis of TG13 severity is associated with multiorgan failure and should be treated in the intensive care unit. Percutaneous cholecystostomy is often used in these patients because they are not suitable for cholecystectomy [7]. Percutaneous cholecystostomy involves the introduction of a catheter into the gallbladder which can be done through ultrasound or computerized tomography. This procedure can be done by a transhepatic or transperitoneal route. The procedure is associated with minimal risk and complication rates. It is a safe procedure to perform in elderly patients with acute biliary sepsis [8,9].

We have conducted this review article to describe the indications for percutaneous cholecystostomy, the time for removal of the tube, the complications of the procedure, and the comparison of this procedure with emergency cholecystitis. We conducted a literature search using PubMed, the Cochrane database of clinical reviews, Google Scholar, and Semantic Scholar, searching for randomized control trials, systemic reviews, meta-analyses, and observational and cohort studies from 1990 to 2023. All selected articles were available in full text. The following keywords were used “Percutaneous cholecystostomy,” “acute cholecystitis,” “conservative treatment of acute cholecystitis,” “cholecystectomy,” and “non-operative treatment of acute cholecystitis.” All articles were written in English and pediatric and pregnant patients were excluded from this review. Case reports and comments were excluded.

## INDICATIONS FOR PERCUTANEOUS CHOLECYSTOSTOMY

Percutaneous cholecystostomy is performed in elderly patients with co-morbidities who present with acute cholecystitis. It was initially performed in patients who were not fit for surgery and who were hemodynamically unstable. These patients were often above the age of 70 and had an American Society of Anesthesia score of more than 2 and those that were septic. It is used as a bridging procedure to stabilize the patient and perform a cholecystectomy later [10-15].

Percutaneous cholecystostomy can be performed by the transhepatic route of the transabdominal route. The procedure

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is performed by the radiologist with an ultrasound approach. The transhepatic route is more common and easier to perform. The incidence of catheter dislodgement is also much less when compared to the trans-abdominal route. It was also associated with a reduced risk of biliary peritonitis [16-19]. When early percutaneous cholecystostomy is performed within 24 h of presentation of symptoms of acute cholecystitis is associated with reduced morbidity and duration of hospital stay. This highlights the importance of early diagnosis and treatment of this condition [20,21].

The incidence of recurrence of acute cholecystitis after percutaneous cholecystostomy has been reported to be 20% and only one-third of patients undergo a cholecystectomy due to their underlying medical problems and risk factors for anesthesia. It is often associated with repeated admissions to the hospital [22].

Percutaneous cholecystostomy can be performed as a definitive procedure in up to one-third of elderly patients who are present with acute cholecystitis. It is a convenient and effective procedure that is associated with low complication rates. Once the procedure is performed the catheter is kept for at least 3 weeks. Due to the high anesthetic risk to older patients, this procedure often becomes the definitive treatment option [23-26]. The use of percutaneous cholecystostomy in the management of mild-to-moderate acute cholecystitis was performed by selected retrospective studies but the recurrence rates and readmission rates were high, and it failed to demonstrate any long-term clinical benefit [27-29]. A cholecystogram should be performed in all patients who have a percutaneous cholecystostomy to look for obstruction at the cystic duct or the presence of incidental common bile duct stones. This will help in deciding whether these patients may require an endoscopic retrograde cholangiopancreatography or imaging like a magnetic resonance cholangiopancreatography [30].

Percutaneous cholecystostomy is often associated with longer stays in the hospital and increased pain over the tube site. It is also associated with recurrent admissions for cholecystitis. The management of the cholecystostomy tube is a problem with a risk of tube dislodgement and subsequent bile peritonitis [31,32]. Some factors that affect recurrence after placement of a percutaneous cholecystostomy tube include patients who present with severe cholecystitis, leukocytosis, and prolonged duration of tube placement [28,33].

A nationwide study comparing the long-term outcomes of percutaneous cholecystostomy to cholecystectomy by Anderson *et al.* included patients who were followed up over 12 years. This study concluded that percutaneous cholecystostomy was associated with reduced complications when compared with patients who underwent cholecystectomy, but it was associated with prolonged hospital stays and increased cost [34].

### CONSEQUENCES OF PERCUTANEOUS CHOLECYSTOSTOMY

The duration of placement of the percutaneous cholecystostomy tube with depend on the co-morbidities of the patient as a retrospective study by Boules *et al.* showed that 32.9% of patients who underwent percutaneous cholecystostomy subsequently

underwent cholecystectomy. Tube placement may be longer in old and frail patients. A retrospective study by Bundy *et al.* looking at the long-term outcomes of percutaneous cholecystostomy showed that only 29.6% of patients underwent cholecystectomy but percutaneous cholecystostomy was successful in all the patients who underwent the procedure [35,36].

Prolonged placement of the percutaneous cholecystostomy catheter is associated with increased morbidity and hospital stay. The average duration of keeping the tube includes 4–6 weeks when the acute cholecystitis is controlled. Removal of the catheter should be performed after 21 days. Factors that favor successful percutaneous drainage and subsequent cholecystectomy include younger patients and reduced anesthetic risk [37-40]. In patients with severe acute cholecystitis with co-morbidities and are not fit for cholecystectomy, the percutaneous cholecystostomy tube often becomes a definitive treatment as it is associated with low risk [41].

### PERCUTANEOUS CHOLECYSTOSTOMY VERSUS CHOLECYSTECTOMY IN HIGH-RISK PATIENTS

A systemic review and meta-analysis by Huang *et al.* on percutaneous cholecystostomy versus emergency cholecystectomy in the treatment of acute cholecystitis in high-risk patients found that percutaneous cholecystostomy was associated with increased morbidity, mortality, length of hospital stay, and cost when compared with cholecystectomy. They concluded that emergency cholecystectomy is superior to percutaneous cholecystostomy. These findings were also confirmed by systemic reviews and meta-analyses that were conducted by Cirocchi *et al.* and Markopoulos *et al.* who compared emergency cholecystectomy against percutaneous cholecystostomy in the management of acute cholecystitis in high-risk patients [42-44].

The laparoscopic cholecystectomy versus percutaneous catheter drainage for acute cholecystitis (CHOCOLATE) multicenter randomized clinical trial where 142 high-risk acute cholecystitis patients were randomized to 66 who underwent emergency cholecystectomy and 68 who underwent percutaneous cholecystectomy. The results of this trial showed that the percutaneous cholecystostomy group was associated with increased morbidity, recurrence rate, and prolonged hospitalization when compared with the emergency cholecystectomy group. This trial concluded that emergency laparoscopic cholecystectomy is preferred to percutaneous cholecystostomy in the management of high-risk patients with acute cholecystitis [45]. Table 1 showing the comparison between percutaneous cholecystostomy and emergency cholecystectomy.

### CONCLUSION

Percutaneous cholecystostomy is an ideal bridging tool that can be used in the management of acute cholecystitis in high-risk patients. It is a safe minimally invasive treatment option to stabilize high-risk patients and perform cholecystectomy later. Percutaneous cholecystostomy is associated with reduced morbidity but it is associated with a higher mortality rate and prolonged hospital

Table 1: The comparison of the mortality, complication, and recurrence rates of PC and EC

Study	Study type	N=numbers	PC-recurrence rate%	EC recurrence rate%	PC complication rate%	EC-complication rate%	PC-mortality rate5	EC-mortality rate
Loozen <i>et al.</i>	Randomized control trials	142-66-EC 68-PC	53	5	65	12	9	3
Cirocchi <i>et al.</i>	Systemic review and Meta-analysis	37,634-32,634-PC 4663-EC	21.56	10.96	30.76	11.15	13.78	2.37

PC: Percutaneous cholecystostomy, EC: Emergency cholecystectomy

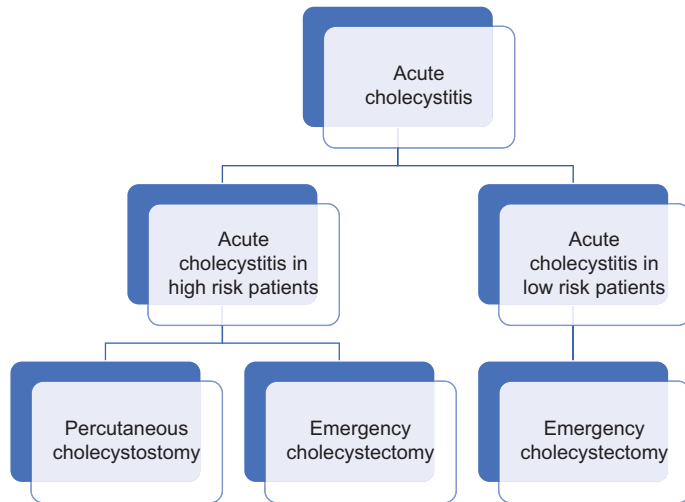


Figure 1: Describes the flow chart of the management of acute cholecystitis

stay. Several systemic reviews and the multi-center randomized control trials (CHOCOLATE) however have demonstrated that emergency laparoscopic cholecystectomy is associated with better outcomes than percutaneous cholecystostomy in the management of acute cholecystitis in high-risk patients.

Percutaneous cholecystostomy still has a role to play in the management of high-risk patients with acute cholecystitis in countries where intensive care management is not available and expertise in surgical management is not available. Future randomized control trials will need to be done by looking at the duration of the cholecystostomy tube, the method of percutaneous cholecystostomy tube insertion, and the recurrence rate.

The major drawback of this review was that most of the studies were retrospective and that there were very few prospective studies and randomized control trials. Further research should also be conducted to see if percutaneous cholecystostomy can be performed in mild cases of acute cholecystitis and used to convert patients who would have needed an emergency cholecystectomy to a delayed elective cholecystectomy.

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