

Percutaneous cholecystostomy and acute cholecystitis: how, when and why



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AIM: *Acute cholecystitis (AC) is one of the most frequent pathologies treated in urgency. An immediate surgical intervention for frail patients who are ineligible for surgery as a result of severe co-morbidities is questionable. The aim of this study is to investigate the safety and the management of percutaneous cholecystostomy (PC) in high-risk surgical patients.*

MATERIALS AND METHODS: *In the period of time January 2015 – May 2021 we observed 1105 patients admitted with acute cholecystitis in our Department. In the group with severe cholecystitis (160 patients, 14.48%), 137 (12.39%) were submitted to immediate surgery, and 23 (4.8%) were treated with PC. All these patients were non-responding to conservative management. Initially, we used PC as a definitive treatment; from the second half of 2018 PC was implemented as a bridge to surgery.*

RESULTS: *Clinically, symptoms resolved in all the 23 patients. Mortality was nihil and no complication was recorded. PC was used as definitive treatment in 14 cases, whereas in 9 patients PC was intended as a-bridge-to-surgery treatment, and was followed by cholecystectomy.*

DISCUSSION: *2017 guidelines, of World Society of Emergency Surgery recommended PC as a safe and effective management of AC in patients with multiple comorbidities. In this group of patients PC achieves a prompt resolution of clinical symptoms and is superior to conservative management. There are no absolute contraindications to PC.*

CONCLUSIONS: *PC is a safe and less invasive treatment of AC for patients with prohibitive surgical risk. It may be used as bridge to surgery to switch high-risk for moderate-risk patients, more suitable for a safe and definitive surgical treatment.*

KEY WORDS: Acute cholecystitis, High-risk surgical patients, Percutaneous cholecystostomy

Introduction

Acute cholecystitis is one of the most frequent pathologies treated in the emergency room. As the average age of the population increases, the age of patients suffering from biliary pathology is also progressively increasing.

Currently the gold standard treatment of AC is early laparoscopic cholecystectomy.

The treatment strategy for patients who are ineligible for surgery as a result of severe co-morbidities is not well defined. Due to the operative risk, an immediate surgical intervention is questionable ¹.

Morbidity is high in elderly patients with co-morbidities, with an increased risk not only of laparotomic conversion but also of possible biliary injury. In patients who are critically ill or elderly, mortality following emergency laparoscopic cholecystectomy is about 19% ².

In recent decades, according to the Tokyo guidelines, percutaneous cholecystostomy (PC) has gained acceptance as the definitive or bridge treatment for acute cholecystitis on all patients unsuitable for surgery ³.

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Materials and Methods

In the January 2015 – May 2021 timeframe, we observed 1105 patients admitted to our emergency department with symptoms of acute cholecystitis.

All patients were categorized in 3 groups according to the Tokyo guidelines, depending on the severity of the cholecystitis:

- grade I (or mild), when there is no organ dysfunction and disease in the gallbladder is limited;
- grade II (or moderate), that is associated with no organ dysfunction, but extensive disease in the gallbladder, resulting in increased difficulty to safely performing a cholecystectomy;
- grade III (or severe), presenting an acute cholecystitis with organ dysfunction.

Most of them, with grade I and II cholecystitis (945 patients - 87.61%), underwent either conservative treatment or delayed surgery.

191 Patients (20.2%) were affected by acalculous cholecystitis and underwent conservative treatment. Of the remaining 754 patients with calculous cholecystitis 511 (54,1%) were discharged from the emergency department, in anticipation of elective surgery, to be performed within 6 – 8 weeks and 243 (25.7%) were considered unfit for immediate surgery due to the need of further radiological investigations, such as cholangio-RM or abdominal TC, related to the diagnostic hypothesis of biliary pancreatitis or to the presence of common bile duct stones.

In the group with severe cholecystitis (grade III) consisting of 160 patients, 137 were submitted to immediate surgery. The surgical approach is considered immediate/urgent if performed within 72 hours of symptom's onset. The remaining 23 patients were treated with percutaneous cholecystostomy. All these patients were undoubtedly more ill due to their underlying condition, and at that moment unfit for immediate surgery, with an ASA score 4, and non-responding to conservative management.

PC was performed under local anesthesia, using an aseptic technique with an 18 Gauge needle inserted into the gallbladder by a transhepatic route and under direct ultrasound guidance. A guide wire is nested into the lumen followed by serial dilatation and placement of a drainage tube built by an 8 or 10 French pigtail catheter. A tube cholangiography was performed to check that the cystic duct was clear and to exclude stone's presence in the biliary duct. Bile cultures obtained during tube placement were used to target antibiotic therapy.

Results

We observed the clinical resolution of symptoms and a laboratory improvement in all the 23 treated patients (100%), within 48 hours from the procedure. There were

no procedure-related mortality nor complications (i.e major bleeding and bile leak).

In 1 case we observed the catheter dislodgment, and the patient was kept under observation for 5 weeks and followed weekly in ambulatory care.

In all patients the gallbladder tube drainage was left in for at least 6 weeks, in order to have the complete maturation of the tract. The patients were discharged with drainage in place. Since the external catheter requires continuous and additional care, these patients have received adequate nursing training and support during their hospital stay.

Once discharged, the patients were clinically controlled with a mean follow-up period of 11 months (range 1-63 months).

Fourteen of 23 patients received percutaneous cholecystostomy as definitive treatment. After being discharged from the hospital, no patients developed either long-term complications nor symptoms such as recurrent biliary colic, infections, catheter dislodgment.

Following PC, 9 patients in the more recent part of the series underwent laparoscopic cholecystectomy. The interval between PC and surgery lasted from 8 weeks minimum to 31 weeks maximum. However no patient underwent surgery before two weeks from tube removal. At surgery, three patients had their minimally invasive procedure converted to open surgery due to intense fibrosis, adhesions and unclear anatomy.

Discussion and Comments

Acute cholecystitis is a very common disease. The diagnosis is suspected based on clinical signs and laboratory findings, and is confirmed by ultrasound scan.

The question about optimal timing for surgery of an inflamed gallbladder is a matter of debate, although recommendations expressed by consensus statements and guidelines favors early cholecystectomy⁴. When early surgery is not performed, patients are mostly treated with antibiotics and supportive therapy delaying surgery for weeks. The main reasons for delaying surgery are the expected high risk due to other medical conditions and comorbidities. The mortality rate of laparoscopic cholecystectomy (LC) for high-risk has been estimated between 5% and 30%⁵.

Laparoscopic cholecystectomy represents the only definitive cure for symptomatic gallstone-related disease. The LC conversion rate for acute cholecystitis is higher than elective surgery and reported between 11% and 28%⁶. On the other hand acute cholecystitis carries a high risk of systemic sepsis and death, particularly in those patients with significant comorbidities and a poor physiological reserve. For these high-risk patients, percutaneous cholecystostomy may be an alternative leading to a prompt resolution of clinical symptoms, including sepsis, and is superior to standard non invasive management⁷.

The clinical decision making may not always be clear in case of elderly and critically ill patients with reduced physiologic reserve⁸.

The advanced age is not a contraindication for surgery. Nevertheless increased age is associated with more comorbidities and decreased life expectancy.

No study has identified the optimal timing for percutaneous cholecystostomy (PC) in patients with acute cholecystitis; PC is typically proposed for patients who fail to improve at 48-72 hours of medical treatment (aggressive intravenous hydration, intravenous broad-spectrum antibiotics, and analgesics) in order to avoid septic complications.

Consistently with the Tokyo guidelines, most of the patients admitted to an emergency setting with symptoms of acute cholecystitis received a conservative treatment. Only about 12% of them underwent cholecystectomy⁹.

Since its introduction in 1980 by Radder¹⁰, who first proposed a percutaneous cholecystostomy (PC) for gallbladder empyema, the procedure gained consensus.

PC involves the radiological placement of a percutaneous drain into the gallbladder under image guidance using either the modified Seldinger technique or the trocar approach. It can serve as bridge therapy, allowing patients to recover from the acute illness and become stable enough to undergo surgery. For those patients who present significant comorbidities with no room for improvement, percutaneous cholecystectomy can be used as definitive treatment¹¹.

The aim of percutaneous cholecystostomy is to relapse the septic problems and to operate in an elective setting. This type of treatment is superior to a conservative approach consisting of antibiotic and fluid therapy because the gallbladder drainage tackles the symptoms' root cause.

Percutaneous cholecystostomy has proved effective especially in severe acute calculus cholecystitis (ACC) and, in extremely ill patients with multiple comorbidities (ASA III or more).

However, indications to perform a PC have not yet been clearly established in Literature. The decision-making process is based on the surgeon's preference and experience, but in close collaboration with other professional figures, such as the interventional radiologist and the anesthesiologist.

Successful treatment of acute cholecystitis with percutaneous cholecystostomy is defined by the Society of Interventional Radiology as the resolution of fever, pain, and factors responsible for inflammation¹².

PC helps reverse the inflammatory process with a response rate reported in the literature between 56 and 100%¹³.

According to the Tokyo guidelines the use of PC could be an overtreatment, if the procedure is not limited to elderly and sicker patients. The 2018 Tokyo guidelines highlight the importance to avoid biliary injury and com-

plications. According to this point of view, the potential benefit of open cholecystectomy, subtotal cholecystectomy and percutaneous cholecystostomy should be considered in the decision-making process regarding treatment. In their 2017 guidelines, the World Society of Emergency Surgery recommended PC as a safe and elective treatment for acute cholecystitis (AC) in patients critically ill or with multiple comorbidities¹⁴.

There are no absolute contraindications to PC, but it may not be feasible in case of a lacking radiological window, severe coagulopathy and necrosis of the gallbladder wall¹⁵.

Technical success for cholecystostomy tube placement has been reported to reach 100% with all patients having clinical resolution of acute cholecystitis⁹. Usually, clinical and laboratory response has become evident within 72 hours after the procedure.

The trans-hepatic approach is preferred over the trans-peritoneal because it reduces the risk of biliary leaks and it allows the drainage to be left in place for a longer period, leading to a more rapid maturation of the draining tract. However, unlike transperitoneal, trans-hepatic approach may carry the risk of pneumothorax and bleeding from the hepatic parenchyma.

The most common complications of PC include bleeding, vagal reaction, secondary sepsis, biliary leakage, pneumothorax, intestinal perforation, catheter dislocation and recurrent cholecystitis.

There is little evidence about the catheter care and the ideal timing for drainage removal. In a study, the interval of the catheter stay was reported to range from 2 to 193 days¹⁶.

The cholecystostomy tube should be removed after the tract is mature and the clinical symptoms of cholecystitis have resolved. In our experience, this process can take approximately 4-6 weeks. If the cystic duct is not patent, there is high risk of relapse.

There is no evidence that links the clinical outcome to the length of tube stay.

PC leads to the development of fibrosis between the gallbladder (corpus and fundus) and the liver in most of the patients, making the laparoscopic surgical approach to cholecystectomy more difficult.

Several studies have shown that PC has favorable short-term outcomes, but its long-term role is still unclear. Some authors have reported a higher mortality rate¹⁷, but PC is performed on critically ill patients for associated pathologies, and this should not be underestimated¹⁸.

In a recent study from the Netherlands on high-risk patients with AC, laparoscopic cholecystectomy was compared with percutaneous catheter drainage. The authors concluded that laparoscopic cholecystectomy performs better compared to PC in terms of clinical outcome and costs, and thus should be considered the preferred strategy for the management of AC¹⁹.

In our experience, the indication for PC in AC is based on an accurate clinical evaluation that considers the age

of the patient, any comorbidity, the ASA class, and the general conditions after a consultation among the surgical and anesthesiological teams. PC is indicated when it comes to be the only available procedure for the patients with severe cholecystitis who do not respond to an aggressive medical therapy.

The optimal timing to perform the cholecystectomy after a treatment with bridging cholecystostomy still remains an unresolved issue. Time decision for cholecystectomy should be based on the fact that relapsing symptoms after gallbladder drainage may reach 6 to 20% per year. Conversely, a recent retrospective study has challenged the traditional idea of PC as a bridging therapy, suggesting its potential use as a definitive treatment for AC²⁰.

Our policy is to offer PC patients a laparoscopic cholecystectomy that once the acute state and sepsis have subsided, possibly by two months after the percutaneous procedure.

The present paper has some limitations since it is a retrospective study, with a relative small number of patients treated in a single centre.

Conclusions

For frail patients, lifesaving and less invasive alternative treatment options are needed. Several studies have shown that PC has favorable short-term outcomes, but its long-term role is still unclear. Guidelines on its clinical utility and application are needed.

Percutaneous cholecystectomy should only be used in a subgroup of high-risk patients, both to convert them into moderate-risk patients, more suitable for surgery, and because they are considered inoperable.

Riassunto

INTRODUZIONE: Il gold standard nel trattamento della colecistite acuta è la colecistectomia laparoscopica. Come descritto in Letteratura, se la colecistectomia è utilizzata come primo approccio terapeutico, in pazienti ad alto rischio presenta un tasso di morbilità del 62% e una mortalità del 50%. Ad oggi la strategia di trattamento per i pazienti non candidabili all'intervento chirurgico, e gravati da comorbidity di rilievo, non è ben definita. Inoltre, con l'aumentare dell'età media della popolazione cresce progressivamente anche l'età dei pazienti affetti da patologia biliare. Un possibile approccio per i pazienti ad alto rischio chirurgico è rappresentato dalla colecistostomia percutanea, ma le indicazioni per eseguire tale procedura non sono ancora state chiaramente definite in Letteratura.

Lo scopo del nostro studio è di indagare il profilo del paziente candidabile alla colecistostomia percutanea, nonché la sicurezza e l'efficacia di tale trattamento.

MATERIALI E METODI: Nel periodo compreso tra Gennaio 2015 e Maggio 2021 abbiamo osservato un totale di 1105 pazienti ricoverati con diagnosi di colecistite acuta. 945 pazienti (87,61%) sono stati sottoposti a trattamento conservativo o ad intervento chirurgico differito a risoluzione del quadro acuto. Nel gruppo di pazienti affetti da colecistite severa (grado III) (160 pazienti, 14,48%), 137 (12,39%) sono stati sottoposti ad intervento chirurgico immediato e 23 (4,8%) sono stati trattati con colecistostomia percutanea. In tutti questi pazienti (classificati nella categoria di rischio ASA IV) è stato osservato un fallimento del trattamento conservativo. Nel primo periodo della nostra esperienza, abbiamo utilizzato la colecistostomia percutanea come trattamento definitivo. Dalla seconda metà del 2018 è stato anche considerato come trattamento ponte per la chirurgia in elezione.

RISULTATI: Nella nostra casistica, abbiamo osservato il successo clinico in tutti i 23 pazienti trattati (100%) e non sono state riscontrate complicanze intra- e post-procedurali. La colecistostomia percutanea è stata utilizzata come trattamento definitivo in 14 casi e come *bridge-to-surgery* in 9 casi.

DISCUSSIONE: Come riportato dalle linee guida della World Society of Emergency Surgery, pubblicate nel 2017, in pazienti con colecistite acuta ad elevato rischio chirurgico la colecistostomia percutanea sembrerebbe portare ad una pronta risoluzione del quadro clinico, risultando essere una strategia meno invasiva rispetto all'approccio chirurgico in urgenza e più efficace rispetto al solo trattamento conservativo. Non risultano esserci controindicazioni assolute all'utilizzo di tale tecnica.

CONCLUSIONI: La colecistostomia percutanea può essere considerato un trattamento sicuro per pazienti fragili con insufficienza d'organo e rischio chirurgico elevato. Tale approccio può dunque essere utilizzato sia come trattamento *bridge-to-surgery* in modo da convertire pazienti ad alto rischio a rischio moderato (e quindi candidabili ad intervento chirurgico) sia come trattamento definitivo.

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