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Original Research

Emerging indications for percutaneous cholecystostomy for the management of acute cholecystitis – A retrospective review

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ABSTRACT

Acute cholecystitis is a frequent cause of general surgical admissions with a mortality risk that is related to the age of the patient. Percutaneous cholecystostomy (PC) has been used as a bridging technique while awaiting resolution of sepsis. We evaluated the outcome of our study population following percutaneous cholecystostomy for acute cholecystitis due to benign etiologies.

Methods: Retrospective review of patients undergoing PC from January 1988 to December 2008. Patients were reviewed for demographic features, co-morbidity, resolution of symptoms, hospital stay, outcome, complications and ASA class.

Results: 62 patients underwent PC for acute cholecystitis. 49 patients had calculous cholecystitis. 61% ($n = 38$) were ≥60 years old. 92% had resolution of symptoms within 48 h, and 8% had partial or no resolution. 84% had a decline in total leucocyte counts. The mean hospital stay was 10.6 days and 30-day mortality was 15%. 69% patients had no post-procedure complication. Of the remainder, 1 patient had post-procedure hemorrhage and the remaining developed complications that included pneumonia, hypotension and vasovagal reactions. The duration of drainage ranged from 1 to 3 months. 3 patients underwent emergency cholecystectomy during the same admission, 20 patients underwent interval cholecystectomy. 22 patients had no further intervention and had no recurrent symptoms, of these 73% ($n = 16$) had calculous cholecystitis. In this sub-group of non-operated patients, 76% were ASA III & IV.

Conclusions: PC is a low risk management option for high risk patients with acute cholecystitis. It can be used as a temporizing measure while awaiting resolution of sepsis and optimization of co-morbidities, or as a definitive therapeutic option for acalculous cholecystitis. We also conclude that it has a good potential to be used as a definitive therapy for high risk (ASAIII & IV) patients with acute calculous cholecystitis.

1. Introduction

Acute cholecystitis (AC) is one of the most frequent causes for acute general surgical admission, with 50–70% of cases occurring in elderly patients.[1] The mortality of AC increases exponentially with age, from 2.8% in the general population to 11.4% in those over 80 years of age. The mainstay of therapy for acute cholecystitis is cholecystectomy, yet reported mortality rates are as high as 5%, increasing to 14 – 30% in high risk patients such as the elderly or critically ill. Failure of conservative management can result in complications including perforation or gangrenous cholecystitis requiring emergency surgical intervention with reported mortality rates as high as 30%.[2]

The appropriate management of acute cholecystitis in critically ill or elderly patients with underlying medical conditions is a controversial issue due to the high postoperative morbidity and mortality rates after emergency cholecystectomy. Surgical cholecystostomy, introduced by Bobbs, was the only available treatment of AC for more than a century. Percutaneous cholecystostomy (PC) was first described in 1921 as a diagnostic test. US-guided cholecystostomy for therapeutic purposes was first reported in 1979.The first report of PC for the management of acute cholangitis was in 1980.[2] It has been used as a relatively safe and efficient temporizing measure in the treatment of acute cholecystitis in high risk patients with serious co-morbidity and in elderly patients, circumventing the general anesthesia required for laparoscopic or open cholecystectomy.[3] Reported clinical response rates are in the range of 56–100%.[3–6]

Drainage is followed by interval cholecystectomy after a variable period of time. In patients with acalculous cholecystitis, percutaneous gall bladder drainage may be the only treatment necessary.

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It is generally agreed that PC is a comparatively safe and effective procedure in the treatment of acute cholecystitis in high-risk patients with serious co-morbidity. The aim of this study was to determine the safety and efficacy of the use of tube cholecystostomy with interval laparoscopic cholecystectomy in selected patients with acute cholecystitis and to evaluate the clinical efficacy and outcomes of percutaneous cholecystostomy alone as an alternative treatment option for elderly and critically ill patients who have acute cholecystitis.

2. Patients and method

A retrospective chart review of patients undergoing Percutaneous Cholecystostomy for acute cholecystitis between January 1988 and December 2008 at a tertiary care hospital was conducted. The patients were managed by a group of six general surgeons.

Indications for the procedure included patients with ASA grade III/IV or significant sepsis resulting in hemodynamic instability at the time of presentation. These patients were deemed to be moderate or high risk for general anesthesia. Depending on the severity of sepsis and supportive care required, the procedure was performed either at the bedside or in the ultrasound suite. All procedures were performed under ultrasound guidance. The distended gall bladder was visualized and local anesthetic infiltrated into the overlying skin and subcutaneous tissue. The gall bladder was then cannulated with a plastic pig-tail catheter using the Seldinger technique. The catheter was then anchored to the skin. The possible route of the catheter was transperitoneal or transhepatic. Initial aspirated bile was cultured and antibiotic sensitivity of organisms isolated was established. Subsequently, the catheter was allowed to drain by gravity. Removal of the catheter required no anesthesia and was accomplished by cutting the anchoring stitch and releasing the pig-tail string where applicable before applying gentle traction till the catheter was retrieved.

Patients were reviewed for demographic features, co-morbidity, resolution of symptoms, hospital stay, outcome, complications and ASA class. All variables were recorded. SPSS (VERSION 16) was used to analyze the data.

3. Results

Sixty-two patients had cholecystostomy tubes placed between January 1988 and February 2009. Forty five percent ($n = 28$) of these patients were males and 55% (34%)were female. Sixty one percent ($n = 38$) of the patients were 60 years or older (mean age 63.1 years).All patients had acute cholecystitis. Of these 79% ($n = 49$) had calculous cholecystitis, while the remaining 21% ($n = 13$) had acalculous cholecystitis. Seventy six percent (44) of the patient group were ASA III/IV. The remaining 18 patients were ASA I/II with sepsis and hemodynamic compromise.

In 27 (44%) of the patients, the route of percutaneous cholecystectomy was not specified in the available medical record. The transperitoneal route was used in 22 (35%) and the transhepatic route in 13 (21%) patients.

Ninety-two percent ($n = 57$) had complete resolution of symptoms within 48 h of intervention while 5% ($n = 3$) and 3% ($n = 2$) had partial or no resolution respectively. Eighty four percent ($n = 52$) patients were noted to have a decline in their total leukocyte count (Fig. 1). Bile aspirated at the time of tube placement was culture positive in 41(66%) patients and negative in 12(19%). *Escherichia coli* was the most frequently cultured pathogen (43%), followed by Enterococcus species (11%) (Fig. 2).

The mean hospital stay for the cholecystostomy procedure was 10.6 days (10.0 days). Nine (15%) patients died within 30 days of their hospital stay. All deaths were attributed to persistent sepsis and co-morbidities. One patient had post-procedural bleeding that was managed expectantly. Sixteen patients developed complications unrelated to the procedure, including pneumonia, vasovagal reactions, hypotension etc. There was no bile leak. No complication/s was observed in 43 patients (69.4%).

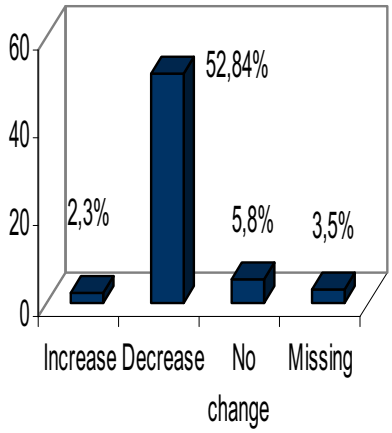

Fig. 1. Change in TLC count.

A highly variable duration of drainage was observed with the highest number of patients having the tube placed for 1–3 months (Fig. 3). The majority of patients (43/69%) did not have a contrast study after tube placement or before its removal. The mean follow-up period was 403 days with a wide range of 4 days–6 years. On follow-up, three (4.83%) patients underwent emergency cholecystectomy. Twenty (32.25%) patients subsequently underwent interval laparoscopic cholecystectomy. Six patients (9.67%) did not undergo a definitive treatment and complained of recurrent symptoms and were managed conservatively.

Interestingly, 22/62 (35.48%) patients did not undergo any further intervention following percutaneous cholecystostomy, nor did they develop recurrent symptoms. Of these patients, sixteen (73%) had calculous cholecystitis, while 6 (27%) had acalculous cholecystitis. The ASA status was assessed for this non-operative sub-group of patients ($n = 22$). Forty seven percent were classified as ASA III patients while 29% fell into the ASA IV category.

4. Discussion

Acute cholecystitis is a common disease with an incidence of 1–3% per year in patients with gallstones(10–20%). Acalculous

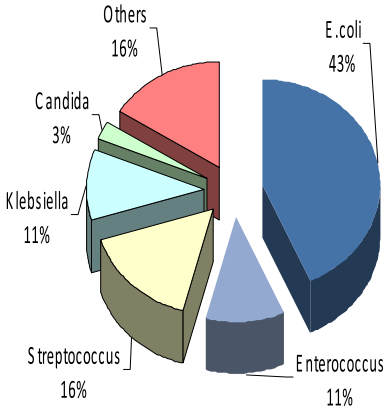

Fig. 2. Cultured organisms.

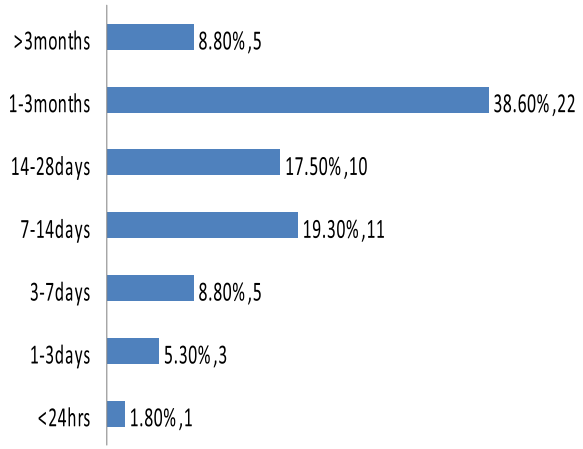

Fig. 3. Duration of Drainage.

cholecystitis makes up 5–10% of cases of acute cholecystitis, occurring most frequently after surgery or during treatment of a critical illness in the ICU setting.[7] Both variants carry a risk of complications including empyema, gangrene, perforation, and peritonitis. Cholecystectomy is the treatment of choice, either open or laparoscopic. 11–20% of patients requiring cholecystectomy present with acute cholecystitis. The application of laparoscopic surgery has been extended to patients with acute cholecystitis, with similar operation time, shorter hospital stay, and complication rates when compared with open cholecystectomy. Nevertheless, two persistent issues remain – a high rate of conversion and the management of critically ill patients who are not good candidates for general anesthesia. The conversion rate of laparoscopic cholecystectomy for acute cholecystitis has been reported to range from 11 to 28%.[8]

The morbidity and mortality associated with emergent cholecystectomy is considerably high in critically ill patients, 55%–66% and 14%–30% respectively. In a meta-analysis, seven studies with a total of 1408 patients undergoing laparoscopic cholecystectomy were identified. The risks of conversion (RR 3.2, 95% CI 2.5 to 4.2) and the overall postoperative complications (RR 1.6, 95% CI 1.2–2.2) were significantly higher in patients with severe acute cholecystitis. Tube cholecystostomy with delayed laparoscopic cholecystectomy has been proposed for the management of these patients as an alternative treatment.[9]

Howard et al reported percutaneous cholecystostomy related morbidity and a mortality of 10–12% and 0–2% respectively, which is lesser than emergent cholecystectomy.

However, mortality rates within 30 days of percutaneous cholecystostomy for acute cholecystitis reported in the literature range from 18% to 69%, attributed to the presence of co-morbid conditions in these selected patients. We report a 30 day mortality rate of 15% following cholecystostomy. The complication rate reported by Borzellino et al for this procedure is 3–12%, which includes hypotension, bleeding, bile peritonitis, pneumothorax, empyema, pleural effusion, catheter dislodgement. Although rare, a potentially serious complication is a bile leak into the peritoneum, resulting in bile peritonitis and, occasionally, sepsis. D'Agostino et al.[10] found that tracts matured by 20 days in all cases in their series. Thus, over this time, catheter removal is expected to become safer with respect to potential bile leaks. The morbidity related to the cholecystostomy tube was 31% in our study and included bleeding, sepsis, pneumonia, peritonitis. We did not encounter any bile leaks after insertion or following removal.

A low feasibility of laparoscopic cholecystectomy has been found for severe cholecystitis. Casillas et al in their review discussed indications for PC. These included relative contraindication to general anesthesia in 1 patient, persistent symptoms lasting beyond 4 days in 5 patients, and a combination of resource constraints and surgeon discretion in 13 patients. Of the 19 patients who underwent PC, 9 eventually underwent interval LC and 10 received no further therapy. There was no statistically significant difference in the LOS or duration of symptoms between the groups, however, patients in the PC (no surgery) group were 2 decades older ($P = .003$).[11]

Seventy six percent of the patients in our study were either ASA status III or IV and 61% were older than 60 years. Clinical resolution of toxemia was observed within 24–48 h in 92% of our patients after cholecystostomy. This is comparable to other studies reporting an 81%–93% response rate. Griniatsos et al[12] reported that cholecystostomy was considered successful in 34/35 patients, 26 of whom responded within 3 days. 17 patients were classified as ASA score III and 7 as ASA score IV. Clinical improvement was noticed in 14 patients within 24 h and in all patients within 72 h. Statistically significant reduction in the values of white blood cells, C-reactive protein, and axillary body temperature were observed within 72 h. The procedure-related mortality was 4%, whereas within a median follow-up of 17.5 months, definitive and effective control of symptoms was achieved in 90.5% of the patients.

In a study conducted by Li et al,[13] A total of 25 patients (10 male, 15 female) with a median age of 81 years (range, 39–97 years) presented with acute cholecystitis and underwent percutaneous cholecystostomy.92% of the patients clinically improved after drainage. There was no major periprocedural complication, and four patients had their catheter accidentally dislodged but did not require re-insertion. There were five inpatient mortalities, although the majority of these deaths were from unrelated illness. Subsequently, only six patients underwent elective cholecystectomy.

The small number of patients in our study prevents us from making comparisons between different techniques of cholecystostomy. However, the transperitoneal route was undertaken in 62% of our patients who received percutaneous cholecystostomy. The transhepatic route was used in 38% while in 44% of the cases route of intervention was not reported. Griniatsos et al report that the transhepatic approach minimizes the risk of intraperitoneal bile leak and inadvertent injury to the hepatic flexure of the colon, but it carries the inherent risks of pneumothorax, intrahepatic bleeding, and hemobiliary fistula.

The management of patients after acute cholecystitis is still controversial. Lebigot et al[14] followed 16 patients for 12 months after PC and reported only one endoscopic sphincterotomy due to ascending cholangitis, and one delayed cholecystectomy due to recurrence of symptoms shortly after removal of the catheter. No additional therapy was required in the remaining patients. In a recent study by Spira et al,[15] the authors were able to apply delayed surgery in 56.4% ($n = 31$) of patients after the acute period. In this study, we re-evaluated the patients after a period of stabilization and optimization of concomitant medical conditions. Twenty (32.25%) patients underwent delayed elective surgery and the remainder were followed. The follow-up period ranges from 4 days to 6 years. Twenty-two (35.5%) patients required no additional therapy and remained symptom free. Recurrent cholecystitis was detected in 6(9.7%) patients and the symptoms regressed with medical therapy.

Though the total number of patients in our study is small, it was observed that a significant number i.e. 22 out of 62 (35%) critically ill patients following percutaneous cholecystostomy, did not undergo any further treatment for cholecystitis, and eventually remained symptom free. The reasons for not undergoing

cholecystectomy included unacceptable operative risk or patient preference. Of these patients, 76% were ASA III/IV. Thus, it can be concluded that PC is not only efficacious as a temporizing procedure before a definitive treatment, but is also a possible 'definitive' treatment option for high risk, elderly patients having cholecystitis.

In conclusion, percutaneous cholecystostomy has a role in the definitive management of selected high risk group patients with acute cholecystitis. Our data suggests that up to one-third of patients with acute calculous cholecystitis and 50% of patients with acalculous cholecystitis can be managed successfully with this modality. It is convenient, has a relatively low and acceptable complication rate and is rapidly effective. Interval laparoscopic cholecystectomy can be safely performed. The high success rate and the low procedure-related complications of percutaneous cholecystostomy have encouraged and expanded its utilization. We feel that this modality can be used as definitive management for patients with acute calculous cholecystitis if the risk of surgery is not acceptable to the health care provider or the patient, without assuming the necessity of an interval cholecystectomy following resolution of the acute episode. Indeed, planning for an elective procedure in a high risk patient almost always triggers a series of expensive and time consuming consultations and investigations that not only burden health care systems, but cause undue stress for patients and their care-givers. A prospective study is planned to better capture patient characteristics and outcomes in this group of patients and will assist in developing guidelines for care.

Conflicts of interest

None.

Funding

None.

Ethical approval

Ethical Committee, Department of Surgery.

Author contributions

Sana Nasim: Data collection, data analysis, manuscript preparation.
Sadaf Khan: Study design, data analysis, manuscript preparation and editing.
Rehman Alvi: Study design, manuscript editing.
Moaz Chaudhary: Study design, Data collection.

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