Patient outcomes after treatment with percutaneous cholecystostomy for biliary sepsis

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ABSTRACT

INTRODUCTION Acute cholecystitis is among the most common general surgical presentations. There is a cohort of patients who develop systemic sepsis and complications of acute cholecystitis. These patients are often elderly and co-morbid. Conservative management with percutaneous cholecystostomy has been shown to be a safe and effective management option in the acute setting. However, there is currently no consensus for the further management of these patients. In particular, there is a paucity of data on readmission rates and subsequent operative or non-operative management.

METHODS A retrospective study was carried out of patients treated with a percutaneous cholecystostomy for biliary sepsis over a three-year period in a UK teaching hospital. Outcome measures were subsequent operative or conservative management, conversion rates, operative complications and readmission rates.

RESULTS Twenty-five patients had a percutaneous cholecystostomy for the treatment of acute biliary sepsis. The median follow-up duration was 35 months. Thirteen patients (52%) had operative treatment. In the operative group, 6/13 had a laparoscopic cholecystectomy, 2/13 had a planned open cholecystectomy, 2/13 had abandoned procedures and 3/13 had a converted procedure. Complications in the operative group included: postoperative mortality (1/13), common bile duct injury requiring drainage and endoscopic stenting (1/13) and one patient required readmission with recurrent pain. In the non-operative group, 5/12 patients were readmitted with biliary sepsis, 5/12 had no readmissions, 1/12 died in the community and 1/12 was readmitted with biliary colic.

CONCLUSIONS Percutaneous cholecystostomy is a recognised treatment modality for elderly, co-morbid patients with biliary sepsis. Nevertheless, the readmission rate in this group is relatively high at 5/12 (42%). Patients who undergo subsequent operative management have a conversion rate of 3/13 (23%) and a significant complication rate of 2/13 (15%). The further management of patients having undergone percutaneous cholecystostomy requires careful consideration on an individual case basis. The P-POSSUM (Portsmouth Physiological and Operative Severity Score for the enUmeration of Mortality and morbidity) may aid decision making.

KEYWORDS

Cholecystostomy – Cholecystectomy – Cholecystitis – Conversion to open procedure

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Gallstone disease or cholelithiasis is a common surgical condition with an estimated prevalence of 19% in males and 29% in females in the UK population.¹ Acute cholecystitis (AC) is a common general surgical condition and represents significant morbidity associated with gallstone disease.² The recommended management for AC consists of antibiotics and early laparoscopic cholecystectomy (LC). Early LC is classified as cholecystectomy within one week of the first hospital presentation with AC.³ Early LC has been shown to be safe, cost effective, reduces length of stay and readmission rates.^{4–8}

However, there is a cohort of patients with significant complications and systemic sepsis secondary to AC. These patients are often elderly, frail with multiple co-morbidities

and not fit for general anaesthesia to facilitate early LC. In such cases, percutaneous cholecystostomy (PC) has been recognised as a useful approach to alleviating sepsis and mediating the situation.

In our institution, there is currently no formalised protocol for the management of such patients with severe AC who are unfit for an early LC (ASA [American Society of Anesthesiologists] grade 3–4) although there has been a trend towards the use of PC with intravenous antibiotics until cessation of sepsis. The further management of these patients, once they have recovered, often poses a dilemma. At present, the decision between operative or conservative intervention is made on an individual basis by the consultant surgeon depending on the following factors: age,

Table 1 Demographics for the operative and non-operative patient groups

Baseline characteristic	Operative group (n=13)	Non-operative group (n=12)	p-value
Average age (years)	62.2	70.4	0.065
Male-to-female ratio	7:6	3:9	0.211
Medical co-morbidities			0.193 (for overall co-morbidities)
Ischaemic heart disease	0 (0%)	1 (8.3%)	
Hypertension	5 (38.5%)	6 (50%)	
Atrial fibrillation	1 (7.7%)	4 (33%)	
Diabetes mellitus	3 (23.1%)	5 (41.6%)	
Cerebrovascular disease	3 (23.1%)	3 (25.0%)	
Respiratory disease	2 (15.4%)	1 (8.3%)	
Mean P-POSSUM			
Physiology score	15.54	19.50	0.010
Operative severity score	9.46	8.17	0.114
Morbidity score (%)	13.77	24.81	0.011
Mortality score (%)	0.63	1.51	0.020

P-POSSUM = Portsmouth Physiological and Operative Severity Score for the enUmeration of Mortality and morbidity

co-morbidity, operative history, ASA grade, recurrent episodes of biliary sepsis and patient wishes. The aim of this study was to review the management of this cohort of patients and to determine whether a treatment algorithm can be designed to aid in the management of such cases.

Methods

A retrospective cohort review was undertaken of patients treated with a PC for biliary sepsis as an acute surgical admission between January 2008 and January 2011 in the general surgical department of a UK teaching hospital. Patients were identified from the radiology department coding system. Case notes, operation notes, radiology records and laboratory records were all reviewed.

The primary outcome measure was type of management (conservative or operative). Secondary outcome measures were rates of LC, open cholecystectomy (OC) and conversion rates, surgical complications, and readmission rates in both the conservative and operative group. Patient demographics, co-morbidities, biochemical and radiological findings, and length of time of PC were noted. The P-POSSUM (Portsmouth Physiological and Operative Severity Score for the enUmeration of Mortality and morbidity) was calculated for patients using the risk prediction scoring system.^{9,10} Data were analysed using Student’s t-test to ascertain statistical significance between the operative and non-operative groups.

Results

Twenty-seven patients had a PC for biliary sepsis. Two were excluded: one owing to pancreatic cancer and one owing to patient transfer. The median follow-up duration was 35 months (range: 22–50 months). Of the 25 patients analysed, 10 were male and 15 female. The mean age was 66.2 years (range: 40–95 years).

Thirteen (52%) had subsequent operative management and 12 (48%) had conservative management. The groups were well matched for demographics and co-morbidities with no significant difference between the groups (Table 1). The P-POSSUM showed the non-operative group to have a significantly higher morbidity and mortality risk associated with cholecystectomy than the operative group ($p=0.011$ and $p=0.020$ respectively).

All patients had radiological imaging to confirm the biliary source of their acute septic episode. The radiological findings are shown in Table 2.

Patients were all treated initially with antibiotics alone. If they were not improving clinically on antibiotics alone and not fit for an early LC, then they proceeded to have a PC inserted. The mean time from admission to PC was higher in the group of patients who were operated subsequently (Table 3).

Outcome measures

Of the 13 operative cases, 6 had LC, 3 had LC converted to OC, 2 had a planned OC, 1 had an abandoned OC and 1 had an abandoned LC. Both procedures were abandoned owing to contracted gallbladder with dense adhesions deemed unsafe for dissection.

Table 2 Radiological findings on ultrasonography

Findings	Operative group	Non-operative group
Acute cholecystitis	5	1
Gallbladder empyema	3	6
Gallbladder perforation	2	5
Pericholecystic collection	2	0
Acalculous cholecystitis	1	0

Table 3 Mean time from admission to insertion of percutaneous cholecystostomy (PC) and duration of PC			
	Operative group	Non-operative group	p-value
Time from admission to PC (days)	6.9	3.9	0.089
Duration of PC insertion (days)	27.4	22.9	0.305

The complication rate was 2/13 (15%); one patient died 2 days postoperatively of ischaemic bowel. This patient was known to have atrial fibrillation, was on prophylactic anticoagulation in the perioperative period and had a P-POSSUM predicted mortality of 1.604%. One patient had a common bile duct injury requiring endoscopic stenting and radiologically guided drainage of a collection.

One patient was readmitted with recurrent pain. However, 9/13 patients (69%) had an uncomplicated recovery and no further admissions. One patient was lost to follow-up.

Of the 12 patients treated conservatively, 5 (42%) were readmitted with a further episode of biliary sepsis, 5 had no further readmissions relating to biliary pathology, 1 died at home of unknown causes and 1 was readmitted with biliary colic but showed no signs of AC or biliary sepsis. These results are illustrated in Figure 1.

Discussion

Ultrasonography guided PC was first described in 1979 by Elyaderani and Gabriele.¹¹ A PC can also be inserted at the bedside in the critically unwell patient by a trained radiologist. Both the transperitoneal and transhepatic routes are described, with the transhepatic route being favoured

Figure 1 Flowchart demonstrating outcomes in the operative and non-operative groups

owing to the tamponade effect of the liver parenchyma and a reduced risk of bile leaks.¹²

PC has been demonstrated to be a safe and effective approach to the acute management of sepsis in patients with AC.^{4,15–15} A systematic review found PC to have a low mortality rate of 0.36%, a complication rate of 6.24% and a high success rate of 85.6%.¹⁶ In certain cases, PC may be the definitive treatment if the patient is not a surgical candidate even after the acute event.¹⁷ In other cases, patients may be considered for a cholecystectomy after the acute septic episode has resolved. However, there remains no consensus in selecting these patients for either group.

There are studies that have reviewed outcomes in elderly patients undergoing a cholecystectomy^{17,18} but there are few studies that have reviewed outcomes for elderly patients treated conservatively. In particular, there are sparse data on the rate of recurrent AC in elderly patients. McGillicuddy *et al* reviewed all elderly patients admitted with AC and followed up both the operative and non-operative groups.¹⁷ The study showed 97.6% of elderly patients treated non-operatively had no readmissions with AC or other biliary complications within a 2.5-year follow-up period. However, David *et al* reported a readmission rate of 14.6% over a 12-month period in patients with AC irrespective of age.¹⁹

A number of studies have reviewed cholecystectomies in patients treated primarily by PC and these show laparoscopic conversion rates of 20–30%.^{5,20,21} This is much higher than the reported 1.4% conversion rate in elective LC in patients with no history of PC.²²

In this study, the demographics of the patients show that those in the operative group had a statistically significant lower P-POSSUM for morbidity, mortality and physiology. This may be a contributing factor to the decision to proceed to cholecystectomy. Other demographics were not significantly different between the groups.

The patients in the non-operative group had a readmission rate of 42% with AC. This is exceptionally higher than the 2.4% and 14.6% readmission rates reported by McGillicuddy *et al* and David *et al* respectively.^{17,19} Approximately half of the patients who had a PC then proceeded to a cholecystectomy with a conversion rate of 25% and a complication rate of 15%. The conversion rate is consistent with previously published data.^{5,20,21}

Conversion in this cohort of elderly co-morbid patients increases the associated morbidity and mortality. Careful consideration of patient risk and operative risk must be considered with anticipation of a higher conversion rate.

Further work is necessary to identify the true predicted readmission rate. This will help both clinicians and patients to make informed decisions with regard to intervention. If the true readmission rate is low, the risk of surgery may outweigh the risk of recurrent AC. Nevertheless, if it is shown that recurrent AC and associated morbidity is high (as found in this study), then the risk-to-benefit ratio may weigh in favour of surgery.

Conclusions

The morbidity and mortality associated with AC is significant. PC patients are more likely to have conversion to open surgery or an intraoperative complication than non-PC patients. There is a cohort of patients who are unfit for acute operative management and for whom conservative management is more appropriate. In these patients, PC is an appropriate treatment modality to relieve acute biliary sepsis and it may be acceptable as a definitive treatment option. However, there remain a number of patients who will be readmitted with episodes of recurrent biliary sepsis; these patients require careful assessment of operative and anaesthetic risks, which must be balanced against the risk of further septic episodes. The P-POSSUM may aid decision making. Prospective work in this area is required to help guide practice.

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