

Tube Cholecystostomy Before Cholecystectomy for the Treatment of Acute Cholecystitis

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ABSTRACT

Background and Objectives: Percutaneous cholecystostomy is currently indicated for patients with cholecystitis who might be poor candidates for operative cholecystectomy. We performed a study to evaluate the long-term outcome of patients undergoing emergent tube cholecystostomy.

Methods: This study was a retrospective chart review of patients who underwent tube cholecystostomy from July 1, 2005, to July 1, 2012.

Results: During the study period, 82 patients underwent 125 cholecystostomy tube placements. Four patients (5%) died during the year after tube placement. The mean hospital length of stay for survivors was 8.8 days (range, 1–59 days). Twenty-eight patients (34%) required at least 1 additional percutaneous procedure (range, 1–6) for gallbladder drainage. Twenty-nine patients (34%) ultimately underwent cholecystectomy. Surgery was performed a mean of 7 weeks after cholecystostomy tube placement. Laparoscopic cholecystectomy was attempted in 25 operative patients but required conversion to an open approach in 8 cases (32%). In another 4 cases, planned open cholecystectomy was performed. Major postoperative complications were limited to 2 patients with postoperative common bile duct obstruction requiring endoscopic retrograde cholangiopancreatography, 1 patient requiring a return to the operating room for hemoperitoneum, and 2 patients with bile leak from the cystic duct stump.

Conclusions: In high-risk patients receiving cholecystostomy tubes for acute cholecystitis, only about one third will undergo surgical cholecystectomy. Laparoscopic cho-

lecystectomy performed in this circumstance has a higher rate of conversion to open surgery and higher hepatobiliary morbidity rate.

Key Words: Acute cholecystitis, Percutaneous cholecystostomy, Cholecystectomy.

INTRODUCTION

Controversy remains in the management of acute cholecystitis patients who are considered high-risk candidates for surgery.¹ Although early laparoscopic cholecystectomy is the recommended treatment for patients with acute cholecystitis,^{2,3} emergency cholecystectomy in the high-risk population has been associated with higher morbidity and mortality rates as high as 19%.⁴ Percutaneous cholecystostomy tube (PCT) offers an alternative treatment option in this population^{5,6} because it allows for source control of the infection without the elevated risk of a major invasive procedure.

The efficacy of PCT is well documented,^{7–10} with relief of clinical symptoms in >90% of patients^{5,11} and a mortality rate of <3%.^{11,12} However, there is no consensus regarding the need for subsequent cholecystectomy. Although some surgeons argue that PCT is an adequate treatment in itself, others use PCT as a bridge to interval cholecystectomy.^{9,13} In fact, elective cholecystectomy is recommended by the Tokyo guideline for patients with moderate to severe acute cholecystitis.¹⁴ Large-series studies have shown the efficacy and long-term results of PCT for cholecystitis,^{6,15} yet few studies have documented what portion of these patients receive interval cholecystectomy after PCT placement.^{9,16–18} Furthermore, outcomes data for interval laparoscopic cholecystectomy in this setting are scarce.

This study aims to assess the outcomes of patients undergoing percutaneous cholecystostomy for treatment of acute cholecystitis, with particular focus on those who subsequently undergo interval cholecystectomy.

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PATIENTS AND METHODS

A retrospective analysis of patients who underwent PCT placement between July 1, 2005, and July 1, 2012, was performed at a single institution. In total, 82 patients were identified using billing and *International Classification of Diseases* (ICD9) codes. The Institutional Review Board–Human Research Committee reviewed and approved the study. Patients with missing data were excluded. In all patients, PCTs were placed under ultrasonographic or fluoroscopic guidance by interventional radiologists.

Demographic data, physical findings, patient comorbidities, hospital course, and operative findings were reviewed. The degree of inflammation was recorded as acute or chronic. In addition, all operative notes were reviewed, and for patients whose operations were converted to open procedures, the reason for conversion was identified.

The measured outcomes were as follows: 30-day and 1-year mortality, length of stay, operative intervention, conversion from laparoscopic to open cholecystectomy, and postoperative complications. Cholecystostomy tubes were kept in place until surgery or until they stopped draining. Percutaneous replacement of cholecystostomy tubes was performed in patients with nonfunctional tubes and continued signs of cholecystitis.

RESULTS

During the study period, 82 patients underwent 125 cholecystostomy tube placements. Demographic data are shown in **Table 1**. Most patients (62 patients, 76%) were aged >65 years. Twenty-four patients (29%) had coronary comorbidities, 10 patients (12%) had pulmonary comorbidities, and 3 patients (4%) had cirrhosis. Seven patients (9%) had sepsis on admission. Four patients (5%) died during the 30 days after PCT placement. The mean hospital length of stay for survivors was 8.8 days (range, 1–59 days). Twenty-eight patients (34%) required at least 1 additional percutaneous procedure (range, 1–6) for gallbladder drainage because of a nonfunctional tube and continued signs of acute cholecystitis. Twenty-nine patients (34%) ultimately underwent cholecystectomy. Surgery was performed an mean of 7 weeks after cholecystostomy tube placement. Laparoscopic cholecystectomy was attempted in 25 patients but required conversion to open surgery in 8 cases (32%). The details of these 8 cases are shown in **Table 2**. Adhesions were the reason for conversion in 6 cases, whereas 1 case was converted because of bleeding and another case was converted because of the patient's inability to tolerate pneumoperitoneum. In 4 pa-

Variable	Data
Total patients	82
Mean age (range), y	73 (39–96)
Gender, n (%)	
Male	52 (63)
Female	30 (37)
Medical history, n (%)	
CAD ^a	24 (29)
Coronary artery disease	19 (23)
Coronary bypass	11 (13)
Atrial fibrillation	8 (10)
Congestive heart failure	3 (4)
Pulmonary	10 (12)
Emphysema	3 (4)
Asthma	3 (4)
ARDS ^a	2 (2)
Pulmonary hypertension	2 (2)
COPD ^a	1 (1)
Idiopathic pulmonary fibrosis	1 (1)
Hypertension	34 (41)
Diabetes	24 (29)
Cirrhosis	3 (4)
Renal insufficiency	8 (10)
Sepsis on admission	7 (9)

^aARDS = acute respiratory distress syndrome; CAD = coronary artery disease; COPD = chronic obstructive pulmonary disease.

tients planned open cholecystectomy was performed. Major postoperative complications were seen in 5 patients (17%): 2 patients in the laparoscopic group with postoperative common bile duct obstruction requiring endoscopic retrograde cholangiopancreatography, 2 patients in the laparoscopic group with bile leak from the cystic duct stump, and 1 patient who underwent open cholecystectomy who had to return to the operating room for hemoperitoneum. There were no postoperative deaths.

DISCUSSION

Guidelines from the Society of American Gastrointestinal and Endoscopic Surgeons and the Society for Surgery of the Alimentary Tract recommend early laparoscopic cholecystectomy for patients with acute cholecystitis.^{2,3} How-

Table 2.
Patient Characteristics and Operative Findings for Patients With Conversion to Cholecystectomy Open Procedure

Patient No.	Age, yr	Sex	Reason for Conversion	Length of Operation, h	Length of Postoperative Stay, d
1	42	Male	Omentum adherent	4	3
2	57	Female	Uncontrolled bleeding	3.5	5
3	49	Male	Dense adhesion	3.5	6
4	73	Male	Dense adhesion, inability to identify anatomy	4	5
5	77	Male	Dense adhesion	3	4
6	42	Male	Dense adhesion	4	2
7	70	Male	Dense adhesion	5	4
8	83	Male	Inability to tolerate pneumoperitoneum	3.5	4

ever, controversy exists in the management of acute cholecystitis patients who are critically ill or unfit for surgery. Because emergency cholecystectomy in this setting is associated with higher morbidity and mortality rates,⁴ PCT offers a reasonable alternative. Although the efficacy of PCT has been well studied, questions remain regarding the need for subsequent cholecystectomy. This study represents our experience in 82 patients, with particular focus on those who underwent interval cholecystectomy and their outcome.

One of the clinical questions regarding PCT is whether PCT in itself is an adequate treatment or whether interval

cholecystectomy should be performed in patients who can tolerate the operation. Partly because of this controversy, published numbers on the proportion of patients receiving PCT ultimately undergoing cholecystectomy are extremely variable, with percentages ranging from 3% to 87%^{7,9,10,13,16–22} (**Table 3**). Proponents of PCT alone argue that cholecystectomy should be reserved for patients with clinical relapse. In a study of 60 patients undergoing PCT, Chang et al¹⁰ reported that 88% did not have relapse after PCT removal, concluding that PCT alone without interval cholecystectomy is a reasonable first-line treatment. As a result, in their study only 3% of the patients underwent

Table 3.
Published Studies Investigating Percutaneous Cholecystostomy Tubes for Cholecystitis Followed by Interval Cholecystectomy

Author	No. of Patients With PCT ^a	No. of Patients Undergoing Interval Cholecystectomy (%)	Planned Laparoscopic Approach	Laparoscopic Converted to Open Approach (Conversion % ^b)	Planned Open Cholecystectomy	Mortality (% ^b)	Morbidity (% ^b)
Berber et al, ⁷ 2000	15	13 (87)	11	1 (9)	2	0 (0)	2 (15)
Spira et al, ¹⁶ 2002	55	31 (56)	28	4 (14)	3	0 (0)	0 (0)
Leveau et al, ¹³ 2008	35	3 (9)	3	NR ^a	NR	NR	NR
Paran et al, ¹⁷ 2006	49	28 (57)	25	2 (8)	3	0	4 (16)
Ha et al, ⁹ 2008	65	24 (37)	24	NR	NR	8 (12.3)	NR
Cheng et al, ¹⁹ 2012	185	105 (57)	97	7 (7)	8	8 (4.3)	21 (11.4)
McKay et al, ²⁰ 2012	68	8 (12)	8	3 (38)	0	0	NR
Morse et al, ²¹ 2010	50	11 (22)	7	3 (43)	4	25 (50)	2 (4)
Nikfarjam et al, ²² 2013	32	9 (28)	9	NR	NR	3 (9)	6 (19)
Chang et al, ¹⁰ 2014	60	2 (3)	2	0	0	0	0
Cull et al, ¹⁸ 2014	NR	64	64	10 (16)	0	2 (3)	18 (28)
Present study	82	25 (30)	25	8 (32)	0	0	4 (16)

^aNR = not reported; PCT = percutaneous cholecystostomy tube.

^bPercent of patients undergoing interval laparoscopic cholecystectomy.

subsequent cholecystectomy. Proponents of interval cholecystectomy have also studied this subject. Given the high-risk nature of this population, however, a low percentage of these patients (12%–22%) actually undergo the operation.^{20,21} In a large series of 185 patients with PCT, Cherng et al¹⁹ reported a much higher percentage of patients (57%) receiving interval cholecystectomy. In our series of 82 patients, 29 (34%) underwent interval cholecystectomy.

A particular focus in this study was the outcome of patients who underwent interval cholecystectomy, including conversion rates to open cholecystectomy and postoperative morbidity and mortality. The published results on the conversion rate in this particular setting are variable, ranging from 7% to as high as 43% (**Table 3**).^{7,16–21} Among the 29 cases in our study, laparoscopic cholecystectomy was planned 25. Eight (32%) underwent conversion to an open procedure for various reasons (**Table 2**), mostly—as expected—because of adhesions. In 1 patient the operation was converted to an open procedure as a result of the patient's inability to tolerate pneumoperitoneum. The published conversion rate in routine laparoscopic cholecystectomy is around 1% to 2%.^{23,24} Although the higher conversion rate is expected in this setting with the underlying morbidity of the patient and the degree of inflammation involved, our study provides an objective confirmation. Inherent in the conversion to open procedures is the increased risk of morbidity and death, as well as prolonged length of stay. Published morbidity and mortality rates of open cholecystectomy are 17.8% and 2.8%, respectively, whereas the length of stay is about 6 days.²⁵ Thus our study highlights an important point for the purpose of the physician's discussion with the patient preoperatively.

Among the 25 patients in whom laparoscopic cholecystectomy was performed, hepatobiliary morbidity was encountered in 4 (16%). Morbidity and mortality rates for elective laparoscopic cholecystectomy in the recent era are very low. In a large-series study using results from the American College of Surgeons National Surgical Quality Improvement Program, the morbidity and mortality rates for laparoscopic cholecystectomy were 3.1% and 0.3%, respectively. This significantly higher morbidity rate in the setting of laparoscopic cholecystectomy after PCT placement should also be an important part of the preoperative discussion with patients.

In conclusion, in our experience in 82 patients receiving PCTs for acute cholecystitis, 29 (34%) underwent interval cholecystectomy, 25 of them laparoscopic. Our study

highlights that in this setting, the rate of conversion to an open procedure is much higher (32%), as is the rate of hepatobiliary complications (16%). These results provide important information for our preoperative discussion with patients and family members.

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