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ORIGINAL RESEARCH

Outcomes of Percutaneous Cholecystostomy

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ABSTRACT

Objective: Emergency cholecystectomy in patients with severe comorbidities carries up to 30% mortality. Percutaneous cholecystostomy (PC) is accepted as acute management in these patients. This study evaluated outcomes of PC and the need for subsequent cholecystectomy.

Methods: Retrospective chart review evaluated all patients undergoing PC between June 1, 2005 and January 1, 2010.

Results: Fifty four patients underwent PC. Indications included acute calculous cholecystitis (44%), acalculous cholecystitis (33%) and other (22%). Twelve patients had PC related complications. Seventeen patients underwent CCY 144 ± 133 days after PC placement. 71% of those procedures were converted to open operation. 15% of patients had PC tube removed successfully without cholecystectomy, 62 ± 53 days after PC. Fifteen patients died in hospital after PC, four likely related to biliary pathology. Patients who underwent subsequent cholecystectomy were more likely to have had a diagnosis of acute cholecystitis (71% *vs* 33%, $p < 0.05$). Patients with a diagnosis of acalculous cholecystitis trended toward a higher likelihood of death compared to acute cholecystitis (8 of 18, 44% *vs* 4 of 24, 17%, $p = 0.08$).

Conclusion: PC can be definitive treatment in a minority of patients with acalculous cholecystitis and severe comorbidities. Interval cholecystectomy carries a high complication rate.

Keywords: Percutaneous cholecystostomy, Emergent cholecystectomy.

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RESUMO

Objetivos: la colecistectomía de emergencia en pacientes con multiples comorbilidades puede tener hasta un 30% la mortalidad. La colecistostomía percutánea (PC) es un tratamiento aceptado en este tipo de pacientes. El presente estudio evalúa los resultados de la PC y la necesidad de realizar una colecistectomía de intervalo.

Métodos: Este es un estudio descriptivo, retrospectivo el cual evaluó a todos los pacientes sometidos a PC entre el 01 de junio 2005 y 1 de enero de 2010.

Resultados: 54 pacientes se les realizó PC. Las indicaciones fueron colecistitis aguda litiásica (44%), colecistitis alitiásica (33%) y otros (22%). Doce pacientes presentaron complicaciones relacionadas con el PC. Diecisiete pacientes fueron sometidos a CCY 144 días después de la colocación de PC. 71% de dichos procedimientos se convirtieron en procedimientos abiertos. En 15% de los pacientes con PC, el tubo fue removido con éxito sin necesidad de una colecistectomía de intervalo. 15 pacientes murieron en el hospital después de la PC, en 4 la causa fue probablemente relacionada con la patología biliar. Los pacientes sometidos a colecistectomía posterior fueron más propensos a haber tenido un diagnóstico de colecistitis aguda (71% *vs* 33%, $p < 0.05$). Los pacientes con un diagnóstico de colecistitis alitiásica mostraron una tendencia hacia una mayor probabilidad de muerte en comparación con colecistitis litiásica (8 de 18, 44% frente a 4 de los 24, el 17%, $p = 0.08$).

Conclusión: La PC puede ser el tratamiento definitivo en una minoría de pacientes con colecistitis y comorbilidades severas. La colecistectomía de intervalo conlleva una alta tasa de complicaciones.

Palabras clave: Colecistectomia de Emergencia, colecistostomia percutanea.

INTRODUCTION

A considerable share of the care being provided in United States hospitals is related to emergency surgical procedures.[1] In 2006, approximately 414,000 emergency cholecystectomies were performed in this country.[1] According to the American College of Surgeons National Surgical Quality Improvement Project database (NSQIP), cholecystitis is the number one indication for surgery in the Unites States.[2]

The standard of care for acute cholecystitis is laparoscopic cholecystectomy.[3-5] When emergency surgery is necessary in critically ill patients, there is a high incidence of conversion to open procedure. This group also faces increased morbidity and mortality.[6,7]

In the treatment of acute cholecystitis, early intervention is preferable. Cholecystectomies performed more than 60 hours from the onset of symptoms are fraught with technical difficulty, and are also associated with an increased risk of injury to the biliary tree.[8] Percutaneous cholecystostomy (PC) is accepted as an alternative treatment to emergency cholecystectomy in high-risk patients,[9,10] especially when control of biliary disease is required but operation is not feasible. Traditionally, interval cholecystectomy has been performed when the patient recovers and the risk profile of surgery decreases. PC can also represent a permanent treatment in patients who are not suitable operative candidates, leaving a patient with a permanent drainage tube. It is unknown whether the PC tube can be removed successfully without requiring subsequent operation.

This study was designed to evaluate outcomes of PC, including complications of the procedure, the possibility of PC removal without operation and complications of interval cholecystectomy in a group of patients with severe comorbidities admitted to a tertiary care hospital.

METHODS

From June 1, 2005 through January 1, 2010, charts of patients who underwent PC at the University of Maryland Medical Center were retrospectively reviewed. Institutional Review Board approval was obtained.

Patients were either admitted to or consulted on by the acute care surgery service. Data was collected from the electronic medical record. Demographic data was collected including age, admission diagnosis, presence of comorbidities, indications for the procedure, outcome of the procedure, information as to whether or not subsequent cholecystectomy was performed, complications of PC, early complications of cholecystectomy, and hospital discharge status. Reasons for initially avoiding cholecystectomy were abstracted from the charts and categorized into four categories: Septic shock, cardiogenic shock, anatomic reasons including a frozen abdomen and other. Chi-square testing was used for categorical variables, fisher exact for continuous variables.

RESULTS

A total of 54 patients underwent PC during the study period. The indications for the procedure included acute calculous cholecystitis (24 patients, 44%), acalculous cholecystitis (18 patients, 33%), and other (12 patients, 22%, Table 1). The mean age was 61 ± 15 years. Among the described reasons for avoiding cholecystectomy were septic shock (n = 17), cardiogenic shock (n = 11), anatomic reasons including a hostile abdomen (n = 10), and other (n = 11, Table 2). The mean hospital day of tube placement was 13 ± 17.5 days after admission to the hospital.

Twelve patients (22%) had PC related complications. Two required operative intervention. Nine complications were due to tube dislodgement. In most of these cases, the tube was replaced by interventional radiology without further issues. One dislodgement resulted in bile peritonitis. Two patients with PC developed subsequent infection as determined by culture of biliary fluid later in the hospital stay and required antibiotics. One patient developed a colonic fistula related to the PC tube.

Fifteen patients (28%) died in hospital after PC. Four of the deaths were thought to be attributable to biliary pathology. Of those attributable to biliary pathology, one patient had neutropenia shortly after chemotherapy induction for a relapse of acute myelogenous leukemia. He was scheduled for a bone marrow transplant but became acutely septic due to acalculous cholecystitis. PC tube was placed and the patient died of overwhelming septic shock soon after. The second was admitted for metabolic acidosis and acute renal failure in the setting of advanced multiple myeloma. This patient also had severe COPD, osteonecrosis of the hip and an upper GI bleed the time his acute cholecystitis was diagnosed. The third was a patient with cirrhosis and portal hypertension admitted in septic shock from presumed cholecystitis. These three patients were deemed by the consulting surgical services as unable to survive any operation. The fourth patient was admitted for cholangitis and was suspected to have acute cholecystitis. The patient had an ERCP and PC tube placed but died within 24 hours of hospital admission.

Seventeen patients (31%) underwent interval cholecystectomy at a mean of 144 days after PC placement. Twelve patients (71%) had an open procedure, and five patients (29%) underwent laparoscopy. Of the group that underwent interval cholecystectomy, there were no mortalities. Six patients (35%) developed complications postoperatively; three (18%) were considered serious including bleeding requiring reoperation (n = 2), and enterocutaneous fistula (n = 1).

Table 1: Indications for percutaneous cholecystectomy

Admitting diagnosis	*Indication for PC as noted in the chart*
• 31 weeks pregnant patient, s/p lap appy 2 weeks prior to presentation	• Biliary colic with severe comorbidity
• Pancreatic carcinoma	• Cholecystocolonic fistula
• Ventral hernia with enterocutaneous fistula and morbid obesity s/p gastric bypass	• Choledocholithiasis
• Severe aortic stenosis, cardiac disease	• Cholelithiasis
• Acute NSTEMI	• Chronic cholecystitis
• Sepsis, malnutrition in the setting of mediastinitis s/p cardiac surgery	• Distended gallbladder on imaging
• Metastatic pancreatic adenocarcinoma s/p 2 rounds chemotherapy, patient declined surgery	• Gangrenous cholecystitis
• Shock, unknown etiology	• Microlithiasis/pancreatitis of unknown origin
• Frozen abdomen/aortic injury	• Ruptured gallbladder, delayed presentation s/p trauma
• S/p RLE disarticulation for myonecrosis, due to ischemia	• Sepsis of unknown origin
• Acute myocardial infarction	• Sepsis of unknown origin
• New stroke/ basal ganglia bleed in a patient with child's C cirrhosis with ascites	• Thick-walled gallbladder

Table 2: Chart-abstracted indications to perform PC instead of early cholecystectomy in those who did not have septic shock, cardiogenic shock or anatomic reasons for avoidance of operation

- Two weeks history, operation would be risky
- Severe acute pancreatitis
- AIDS with decreased mental status
- S/p colectomy for c-diff and s/p lung transplant, patient would not tolerate the procedure
- Two weeks history of abdominal pain, rash from IV meds
- AML with blast crises requiring immediate induction chemo
- Unknown
- Guillain-Barre, Gram-negative bacteremia
- Child's C cirrhosis with ascites
- Metastatic pancreatic adenocarcinoma with biliary obstruction s/p PTC
- Pancreatic carcinoma
- Severe shock, unknown etiology
- Hepatitis C cirrhosis with splenomegaly, portal hypertension, varices
- Respiratory failure, would not tolerate operation
- Metastatic pancreatic adenocarcinoma s/p 2 rounds chemo, patient declined surgery

Thirty-seven patients (69%) did not have a cholecystectomy after PC placement, including 15 who died. In 14 patients, the final outcome of PC was unknown. They were discharged with the tube in place and lost to follow-up. Among these patients, the tube remained in place and follow-up was available a mean of 128 ± 195 days. Eight patients (15%) had their PC tubes removed successfully and did not undergo cholecystectomy. All eight patients who had their tube removed were alive at most recent follow-up without biliary symptoms. The mean duration of the tube placement in these patients was 62 ± 53 days.

In order to analyze the decision to perform interval cholecystectomy, all patients discharged alive from the hospital after PC were reviewed. Patients who underwent interval cholecystectomy were more likely to have had a diagnosis of acute cholecystitis (71% *vs* 33%, $p < 0.05$). When looking at other characteristics between the groups, there were no differences in age, hospital day of tube placement, reason PC was chosen over early cholecystectomy (septic shock, cardiac shock, anatomy or other) or presence of infected bile. When comparing the eight patients who had their tube successfully pulled to those who underwent subsequent cholecystectomy, the only difference was the indication for PC. The diagnosis of acute cholecystitis was associated with a decision to undergo subsequent operation (71% *vs* 25%, $p < 0.05$).

Given the association of indication for PC with outcome, we looked at differences between patients with a diagnosis of acute cholecystitis *vs* acalculous cholecystitis. Patients with a diagnosis of acalculous cholecystitis trended toward a higher likelihood of death compared to acute cholecystitis (8 of 18, 44% *vs* 4 of 24, 17%, $p = 0.08$). Patients with a diagnosis of acute cholecystitis were more likely to demonstrate infection of the biliary tree as demonstrated by culture of bile at time of PC (9 of 18, 50%) compared to the acalculous cholecystitis group (3 of 24, 13%, $p < 0.05$).

DISCUSSION

Cholecystitis is a challenging problem in critically ill patients. In the past, conservative treatment has been suggested for high-risk surgical patients.[11,12] Elderly patients with this disease can develop life-threatening complications including empyema, gangrene or perforation.[3] In those situations PC has been considered an adjunct to conservative treatment. Yun et al reported a low mortality and morbidity with PC placement.[13] In this study, PC was used as a bridge to surgery and as palliation in patients with poor ASA scores. In the palliation group there was a mortality of 20% due to underlying ischemic heart disease and multiple organ failure. Other studies report PC complication and mortality rates from 11.1 to 37.8%.[14-16] In a prospective study of 38 consecutive elderly patients, Sugiyama et al concluded that PC is a safe and effective treatment for acute cholecystitis in patients over 80 years of age.[17]

The current series demonstrates a mortality of 28%, and PC related morbidity of 22%. In the majority of cases, mortality was not due to biliary pathology. However, there were four cases in which death was thought to be a consequence of biliary disease. In three of these patients, the surgical team deemed the patient unable to survive operation. Since, this is a retrospective review it is impossible to conclude whether PC was sufficient source control.

After acute cholecystitis there is a risk of recurrent biliary disease ranging from 9.5 to 16.7%.[9,15,17] In the present study, eight patients had their PC tube successfully removed without recurrent biliary symptoms. Fluoroscopic evaluation of the biliary tract was performed prior to tube removal in all cases. These patients were less likely to have a diagnosis of acute cholecystitis and had a trend toward an association with acalculous cholecystitis. This suggests in a small group of patients in whom the underlying disease can be controlled medically, a definitive operative procedure may not be necessary.

Some authors advocate for early surgical treatment in patients with acute cholecystitis.[18-20] In cases where operation is delayed, waiting 6 to 8 weeks until the gall bladder 'cools off' is frequently practiced. This is believed to increase the likelihood of having the procedure completed laparoscopically. In this series, a large percentage of patients

(71%) still required conversion from laparoscopic to open cholecystectomy after PC placement, despite a mean time to surgery over 3 months from tube placement.

This study has some drawbacks. It is a small review of a case series. Only the electronic portion of the medical record was accessible. Because of this, we do not have measures of severity of illness, such as APACHE or organ failure scores at time of PC placement. Despite these flaws, this study does help identify a subgroup of patients in whom PC may be definitive treatment.

CONCLUSION

This study supports the use of PC tubes for the definitive treatment of biliary disease in a minority of patients with severe comorbidities and a diagnosis other than acute cholecystitis. Interval surgery after placement of PC still carries a high conversion to open operation and a high morbidity and needs to be carefully considered. As acute care surgery evolves into a specialty service, more rigorous study, including randomized trials are necessary to determine the best treatment of biliary disease in the critically ill or severely comorbid patient.

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