Percutaneous Transhepatic Cholecystostomy: Effective Treatment of Acute Cholecystitis in High Risk Patients

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Abstract

Background: The mortality rate for cholecystectomy for acute cholecystitis in the elderly is 10% in low risk patients and increases threefold in high risk patients. Ultrasound-guided percutaneous transhepatic cholecystostomy may serve as a rapid and relatively safe tool to relieve symptoms of sepsis and decrease gallbladder distension.

Objective: To determine the safety and effectiveness of PTC in the treatment of acute cholecystitis in elderly debilitated high risk patients.

Methods: The study sample included 10 patients aged 63–88 (mean 77.6 years) with clinical and sonographic signs of acute cholecystitis for more than 48 hours (fever, white blood cells > 12,000/mm, positive Murphy sign and distended gallbladder) who underwent ultrasound guided PTC. All had severe underlying disease (coronary heart disease, renal failure, chronic obstructive pulmonary disease, and others) that places them at high risk for surgical intervention.

Results: Eight patients showed rapid regression of the clinical symptoms following PTC drainage. One patient with bacterial endocarditis was febrile for 5 days after catheter insertion, but with rapid resolution of the biliary colic and sepsis. One patient died from perforation of the gallbladder and small bowel. PTC catheters were withdrawn 3–25 days after the procedure and the patients remained free of biliary symptoms. Two patients underwent successful elective cholecystectomy 3 weeks later.

Conclusion: PTC may be a safe and effective treatment for high risk elderly patients with acute cholecystitis. It can be followed by elective cholecystectomy if the underlying condition improves, as soon as the patient stabilizes and no sepsis is present, or by conservative management in high surgical-risk patients.

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The prevalence of cholelithiasis is rising in the elderly, who currently account for approximately 25% of all cholecystectomies performed for acute cholecystitis [1–3]. The mortality associated with the procedure in this age group is high (30%), mainly as a consequence of complications of anesthesia and laparotomy in patients already at high risk due to the presence of serious underlying co-morbidities [4–9] such as coronary artery disease, lung disease, anginal syndrome, renal failure and others. To overcome this problem, several researchers have suggested that percutaneous transhepatic cholecystostomy may be effective for the decompression of the inflamed gallbladder [10,11]. PTC has several advantages over cholecystectomy: it is rapid, relatively easy to perform, and can be done under local anesthesia at the bedside. It results in prompt resolution of septic symptoms, and sometimes suffices as the definitive treatment.

PTC = percutaneous transhepatic cholecystostomy

Patients and Methods

The study sample included 10 consecutive critically ill elderly patients with a primary clinical and sonographic working diagnosis of acute cholecystitis who were treated in our center from 1998 to 2000. Data were collected by review of the medical charts and the computerized laboratory and radiologic records.

The patients included six women and four men aged 63–88 years (mean 77.6). Five patients presented with nausea and vomiting and eight complained of right abdominal pain. On physical examination, a triad of right upper abdominal tenderness with positive Murphy sign, high grade fever (over 38°C), and leukocytosis (>12,000 cells/mm) was noted in all cases. Sonographic scans demonstrated a distended gallbladder and thickening of the bladder wall by more than 5 mm. Seven patients had cholelithiasis and three had only sludge. There were no signs of perforation and no free fluid collection surrounding the gallbladder.

One patient was already receiving antibiotic therapy for bacterial endocarditis 3 years after mitral valve replacement, and he was referred immediately for sonography-guided PTC. In the others, blood was collected for culture, and conservative treatment consisting of intravenous fluids, no oral intake and broad-spectrum antibiotics (ampicillin, gentamicin and metronidazole) was initiated for up to 48 hours. All had major risk factors that precluded the use of formal cholecystectomy as the primary treatment. PTC was performed only after failure of the initial treatment [Figure 1].

Results

The clinical characteristics, risk factors and management of the patients are presented in Table 1. Persistence of the inflammatory process and sepsis due to acute cholecystitis were considered indications for ultrasonography-guided PTC drainage [Table 1]. Surgical risk was assessed according to the American Society of Anesthesiologists' classification: six patients were class 5 and four were class 4. PTC was performed under local anesthesia. A 30 cm-long 5-9 French catheter with pigtail configuration was inserted into the gallbladder yielding purulent bile. In one patient, the catheter perforated the gallbladder and small bowel causing massive peritonitis. The patient died after laparotomy. There were no other complications, such as bleeding, septicemia, pneumothorax or

Figure 1. Percutaneous transhepatic cholecystostomy for acute cholecystitis: thick arrowhead = percutaneous transhepatic cholecystostomy catheter; arrow = common bile duct; arrowhead = pancreatic duct; transparent arrowhead = second part of duodenum.

hypotension related to the invasive radiologic intervention. Bile cultures were obtained, and continuous drainage was performed for 3–25 days. Nine patients showed symptom resolution within 48 hours. In three patients, preoperative blood cultures grew *Escherichia coli*, a combination of *E. coli* and *Klebsiella*, or *Citrobacter diversus* (in the patient with liver cirrhosis). In seven patients, bile cultures were positive for *E. coli, Bacteroides fragilis* or *Pseudomonas*. In the patient with bacterial endocarditis, the symptoms of acute cholecystitis resolved within 48 hours of PTC, but he remained febrile for 5 more days. No signs of mitral valve insufficiency were observed during or after PTC. The catheter was removed when symptoms of sepsis disappeared and patency of the biliary tract was confirmed by cholecystography. Two patients underwent successful elective cholecystectomy 4 weeks after the PTC.

Discussion

An increasing number of elderly and compromised patients have gallstones, and the incidence of gallstones increases with each decade of life. In the elderly, cholecystectomy for acute cholecystitis carries an operative mortality of approximately 10% in low risk patients and 20–40% in high risk patients [4–9]. Open cholecystostomy has been used as a minimally invasive procedure to decompress the acutely inflamed and obstructed gallbladder. It was the "gold standard" of treatment for many decades. The reported mortality rate associated with open cholecystostomy ranges from 5% [12] to 23% [8]. Laparoscopic cholecystostomy is mentioned [13,14] as a temporary solution instead of immediate conversion to laparotomy in patients with acute cholecystitis after unsuccessful attempts at laparoscopic dissection. In the study conducted by Kuster and Domagk [13], nine patients converted to laparoscopic cholecystostomy and there was no mortality or morbidity. Elective laparoscopic cholecystectomy was performed 3 months later. The length of postoperative hospitalization and disability in the split operation group was notably shorter than in the group converted to open cholecystectomy. The patients who profit most from the split operation are those who show extensive acute inflammation, phlegmon, empyema, and areas of gangrene of the gallbladder, with extensive acute plastered adhesions of omentum and colon, subhepatic abscess, etc., and in whom, in the surgeon's experience, further dissection will probably not lead to laparoscopic cholecystectomy without undue risk of bile duct injury, excessive bleeding, or other complications.

Ultrasound-guided percutaneous drainage of the gallbladder, under topical anesthesia, first described in 1980 by Radder [11], offered an even less invasive option in patients with acute cholecystitis who were unfit to undergo laparoscopy or open cholecystectomy, namely elderly patients with class 4 or 5 disease [15–18].

Specifically, three groups of critically ill patients are potential candidates for PTC insertion: a) patients with severe cardiopulmonary disease who are hemodynamically stable because of sepsis due to acute clinically and sonographically proven cholecystitis;

Table 1. Clinical characteristics and outcome of high risk acute cholecystitis patients who underwent percutaneous transhepatic cholecystostomy

Patient	Age (yr)	Gender	Risk factors	ASA class	Outcome
1	85	F	HTN, rapid atrial fibrillation	5	Resolution of the sepsis; discharge.
2	70	F	Liver cirrhosis, NIDDM, HTN	4	Resolution of sepsis; discharge with closed cholecystostomy
3	63	M	Bacterial endocarditis. S/p MVR, CAF, s/p CVA, global aphasia, lt. hemiparesis and feeding gastrostomy	5	Resolution of acute cholecystitis symptoms
4	88	F	COPD, IHD, BPH, aortic aneurysm	4	Resolution of sepsis, discharged
5	87	M	Dementia, COPD	5	Resolution of sepsis, discharged
6	75	F	S/p abdomino-perineal resection, ARF	4	Resolution of sepsis, discharged
7	84	M	IHD, S/p MI, HTN	5	Resolution of sepsis, discharged; elective cholecystectomy
8	82	F	CVA, recent MI, CHF, IDDM	5	Perforation of gallbladder and small bowel with fulminant peritonitis; died after laparotomy
9	85	M	OBS, IHD, HTN	4	Resolution of sepsis, discharged
10	65	F	IHD, recent MI, severe CHF, NIDDM	5	Resolution of sepsis, discharged; elective cholecystectomy

ARF = acute renal failure, BPH = benign prostatic hypertrophy, CAF = chronic atrial fibrillation, CHF= congestive heart failure, COPD = chronic obstructive pulmonary disease, CVA = cerebrovascular accident, HTN = hypertension, IDDM = insulin-dependent diabetes mellitus, NIDDM = non-IDDM, IHD = ischemic heart disease, MI = myocardial infarction, MVR = mitral valve replacement, OBS = organic brain syndrome, s/p = status post.

b) patients with stable vital signs on admission whose condition deteriorates or who fail to respond to intensive conservative measures within 48–72 hours; and c) patients in intensive care with persistent sepsis and a distended gallbladder due to acalculous cholecystitis.

In our series, unstable anginal syndrome, recent myocardial infarction, atrial fibrillation, uncompensated congestive heart failure, liver cirrhosis, bacterial endocarditis, stroke, severe chronic obstructive pulmonary disease, dementia, and renal failure were documented. The patients either showed a deterioration after admission or failed to respond to conservative treatment.

PTC may have both a diagnostic and curative role in critically ill patients with acute cholecystitis [10,19]. When PTC is performed by a well-experienced invasive radiologist and surgical team, and the diagnosis is well established, the success rate approaches 100% [20,21]. We had one major complication of perforated gallbladder and small bowel in a patient after stroke and recent myocardial infarction. Fulminant peritonitis developed, and the patient died after laparotomy. Major complications described in the literature are hemorrhage, hypotension due to sepsis or vasovagal reaction, pneumothorax, bile leakage and puncture of intraabdominal organs [10]. Minor complications include incorrect catheter positioning, catheter dislodgment, and colonization of the gallbladder with new bacteria [10].

The transhepatic approach for percutaneous cholecystostomy has been found advantageous over the transperitoneal approach [22] because it allows for earlier removal of the catheter – due to the shorter time to development of a mature tract – and reduces the incidence of complications and discomfort to the patient.

PTC may serve as the definitive treatment or as a bridge before elective cholecystectomy [21,23]. Its use in the early treatment of acute cholecystitis in elderly patients can decrease postoperative morbidity and mortality [20]. Cholecystography should be performed 2–4 days after placement of the catheter to demonstrate patency of the cystic duct and the bile tree. PTC may be followed by percutaneous transhepatic cholecystoscopy [24] as a safe and useful diagnostic and therapeutic tool in high risk surgical patients with acute cholecystitis.

If common bile duct stones are present, endoscopic extraction with papillotomy is the procedure of choice. Elective cholecystectomy should be performed as soon as the patient stabilizes and there is no sepsis. We performed elective cholecystectomy in two of our patients, with an uneventful course. However, for the majority of the elderly high risk group, PTC followed by conservative management is probably preferred.

Conclusion

Percutaneous transhepatic cholecystostomy may be a safe and effective mode of treatment for elderly high risk patients with acute cholecystitis. Larger controlled studies are needed to confirm our findings. PTC can be followed by elective cholecystectomy at a later period if the patient's condition permits, or by expectant conservative management in patients who have had acalculous cholecystitis and present a very high mortality risk for surgery.

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