



Is Percutaneous Cholecystostomy the Optimal Treatment for Acute Cholecystitis in the Very Elderly?

Masanori Sugiyama, M.D., Makoto Tokuhara, M.D., Yutaka Atomi, M.D.

First Department of Surgery, Kyorin University School of Medicine, 6-20-2 Shinkawa, Mitaka, Tokyo 181, Japan

Abstract. In elderly patients emergent cholecystectomy for acute cholecystitis is a high risk procedure. We prospectively assessed the value of percutaneous cholecystostomy for acute cholecystitis in 38 consecutive elderly (≥ 80 years) patients. All 38 underwent percutaneous transhepatic cholecystostomy under ultrasonographic and fluoroscopic guidance for acute cholecystitis (25 calculous, 13 acalculous). Eight (21%) patients had acute severe medical problems, such as shock and respiratory distress. Thirty-one (82%) patients had chronic severe underlying diseases, including cardiovascular and neurologic diseases. Cholecystostomy was successful in all 38 patients. Prompt clinical improvement was obtained in 36 (95%) patients. Morbidity and mortality rates were 3% and 3%, respectively. After cholecystostomy, 10 patients with cholelithiasis underwent elective cholecystectomy without serious complications. Two patients underwent percutaneous cholecystolithotomy, which produced complete resolution of symptoms. Four of 12 patients with and none of 12 without cholelithiasis had recurrent cholecystitis after catheter removal during a mean follow-up of 1.8 years. A second cholecystostomy was successful in these four patients. Elderly patients are often poor surgical candidates because of severe cholecystitis or concomitant medical problems. Percutaneous cholecystostomy is a safe, effective treatment for acute cholecystitis even in elderly patients. For calculous cholecystitis, cholecystostomy can be followed by elective surgery, if possible, or by nonsurgical treatment or expectant conservative management in high-risk patients. Cholecystostomy may be a definitive treatment for acalculous cholecystitis.

Emergency cholecystectomy for acute cholecystitis is associated with high morbidity and mortality rates in elderly patients, whereas elective cholecystectomy can be performed safely [1–9]. Percutaneous cholecystostomy, a less invasive procedure, has increasingly been used for treatment of acute cholecystitis, particularly in critically ill or elderly patients [7–13]. We routinely treated all of our elderly patients (≥ 80 years) with acute cholecystitis by means of percutaneous cholecystostomy. We assessed the value of percutaneous cholecystostomy for acute cholecystitis in these elderly patients.

Patients and Methods

Between 1987 and 1996 a total of 38 consecutive elderly patients (≥ 80 years) with acute cholecystitis were studied prospectively: 17 men and 21 women with a mean age of 85 years (range 80–96

years). All 38 patients underwent urgent percutaneous cholecystostomy for acute cholecystitis. The diagnosis of acute cholecystitis was based on clinical signs (fever, right upper quadrant abdominal pain, or right-sided abdominal tenderness) and ultrasonographic abnormalities (gallbladder distension, gallstones, sludge formation, thickened gallbladder wall, ultrasonographic Murphy's sign, pericholecystic fluid collection).

Percutaneous cholecystostomy was performed as follows. Before the procedure systemic antibiotic therapy (a second-generation cephalosporin, 2 g/day) and fluid resuscitation were initiated. Patients received pentazocine (30 mg IM) and atropine sulfate (0.5 mg IM) immediately before the procedure. After local anesthesia, an 18-gauge needle was introduced through the right hepatic parenchyma into the gallbladder lumen under ultrasonographic guidance. After confirmation of needle location by means of bile aspiration, a 0.032 inch J-shaped guidewire was inserted. Then a 7 French (7F) balloon catheter (Sumitomo, Tokyo, Japan) or a 7F pigtail catheter (Hakko, Tokyo, Japan) was placed under fluoroscopic guidance. After complete aspiration of bile, cholecystography via the catheter was performed to confirm the pathogenesis (calculous or acalculous) and location of the catheter in the gallbladder. Overinjection of contrast material was avoided. Bile was sampled for bacterial culture in all patients. In five patients percutaneous cholecystostomy was performed at the bedside under ultrasonographic guidance alone. Approximately 7 days after catheter placement repeat cholecystography was done to investigate cystic duct patency and to assess the common bile duct.

We analyzed clinical features (signs, symptoms, laboratory and ultrasonographic findings, acute and chronic concomitant medical problems) and treatment outcomes (immediate and long term) of acute cholecystitis in the 38 elderly patients who underwent percutaneous cholecystostomy. Acute concomitant medical problems included shock (systolic blood pressure < 80 mmHg and pulse rate > 120 /min), disseminated intravascular coagulation (platelet counts $< 5 \times 10^{10}$ /L and fibrin/fibrinogen degradation products $> 20 \mu\text{g/ml}$), respiratory distress, acute pneumonia, and acute renal failure. Chronic concomitant medical problems were classified as follows: general (bedridden state); cardiovascular (a previous myocardial infarction, congestive heart failure, significant cardiac arrhythmia); pulmonary (chronic obstructive pulmo-

Table 1. Acute concomitant medical problems in 38 elderly patients with acute cholecystitis.

Problem	No. of patients (%)
Shock	5 (13)
Respiratory distress or acute pneumonia	3 (8)
Disseminated intravascular coagulation	2 (5)
Acute renal failure	2 (5)

nary disease, a previous thoracoplasty or pulmonary resection); hepatic (liver cirrhosis); metabolic (diabetes mellitus); renal (chronic renal failure); neurologic (dementia, a previous cerebrovascular accident); malignant (terminal malignant disease).

Results

Before percutaneous cholecystostomy most patients presented with right upper quadrant pain ($n = 35$), right-sided tenderness ($n = 31$), fever ($\geq 38^\circ\text{C}$; $n = 34$), and leukocytosis ($\geq 10^{10}/\text{L}$; $n = 34$). Of the 38 patients, 8 (21%) had acute concomitant medical problems, such as septic shock and respiratory distress (Table 1). Thirty-one (82%) had chronic severe underlying diseases (Table 2). These elderly patients often had associated cardiovascular and neurologic diseases.

Ultrasonographic findings included distension ($n = 35$), wall thickening ($n = 33$), sludge ($n = 29$), and gallstones ($n = 24$; ultrasonography failed to depict a small gallstone impacted in the gallbladder neck in one other patient), pericholecystic fluid collection ($n = 9$), and Murphy's sign ($n = 31$).

Among these 38 patients with acute cholecystitis, 25 had gallbladder stones and 13 did not (acalculous cholecystitis). Seven patients developed acute cholecystitis with ($n = 2$) or without ($n = 5$) cholelithiasis soon after major abdominal surgery.

Percutaneous cholecystostomy was done within 24 hours in 31 patients and within 24 to 48 hours after the diagnosis in 7 patients. In six patients who were unable to hold their breath or to tolerate a drainage procedure because they were critically ill or uncooperative, this procedure was performed safely and successfully under general anesthesia with endotracheal intubation. Cholecystostomy was successful in all 38 patients. No complications related to catheter placement occurred.

The initially aspirated bile was thick and black in 26 patients and purulent in 12. Bile cultures were positive for organisms in 32 (84%) patients. Organisms cultured included *Escherichia coli* ($n = 11$), *Enterococcus* ($n = 9$), *Klebsiella pneumoniae* ($n = 5$), *Pseudomonas aeruginosa* ($n = 2$), *Staphylococcus aureus* ($n = 4$), *Streptococcus faecalis* ($n = 3$), *Serratia* ($n = 2$), and *Bacteroides* ($n = 6$). In seven patients bile cultures were positive for two or three organisms.

The cholecystostomy catheter was removed after acute inflammation resolved and, usually, more than 20 days after the catheter placement unless sequent cholecystectomy was planned. The mean duration of cholecystostomy was 24 days (range 1–94 days) in the calculous group and 22 days (range 8–31 days) in the acalculous group. There was only one (3%) complication: A catheter was pulled out by a confused patient 3 days after the initial drainage and was immediately reinstated without further difficulty. No other complications, such as catheter occlusion or bile peritonitis, occurred after the drainage procedure.

Table 2. Chronic concomitant medical problems in 38 patients with acute cholecystitis.

Problem	No. of patients (%)
General	7 (18)
Cardiovascular	11 (29)
Pulmonary	7 (18)
Hepatic	1 (3)
Metabolic	6 (16)
Renal	2 (5)
Neurologic	10 (26)
Malignant	5 (13)

Thirty-six (95%) patients showed significant improvement in their clinical condition within 24 hours of cholecystostomy (Fig. 1). The two remaining patients did not respond to cholecystostomy. In one patient with calculous cholecystitis, persistent signs of peritonitis 18 hours after the drainage procedure necessitated emergent laparotomy. In this patient an adherent and severely inflamed gallbladder filled with several large stones was treated by cholecystectomy without further complications. Another patient with acalculous cholecystitis died of progressive biliary sepsis and multiorgan failure 19 days after successful catheter placement. He was in the terminal stage of advanced gastric carcinoma and had been severely ill with shock and disseminated intravascular coagulation before cholecystostomy. No other deaths occurred in association with percutaneous cholecystostomy; the mortality rate was 3%. Another three patients died of nonbiliary diseases (acute pneumonia, terminal gastric carcinoma, and congestive heart failure, respectively) 15 to 48 days after drainage cessation during the initial hospitalization.

Repeat cholecystography was performed in all patients and showed obstruction of the cystic duct in five patients. These five patients underwent endoscopic retrograde cholangiopancreatography (ERCP). Cholecystography or ERCP revealed common bile duct stones in 6 of the 38 patients. These six patients underwent successful endoscopic sphincterotomy and stone extraction without complications.

Follow-up extended from the date of drainage to April 1997 or death (mean 1.8 years; range 19 days to 8 years). Most patients died of underlying diseases. Among 24 patients with calculous cholecystitis who responded to cholecystostomy, 10 underwent elective cholecystectomy 8 to 28 days (mean 17 days) after cholecystostomy, with only two minor postoperative complications (wound infection and mild pneumonia) (Fig. 1). Another 14 patients were considered inoperable because of a high surgical risk ($n = 8$) or they refused surgery ($n = 6$). Two patients underwent successful percutaneous cholecystolithotomy [14–16]. In these two patients the cholecystostomy tract was dilated and an 18F sheath was placed. Stone removal was performed through the sheath using a flexible cholecystoscope, basket catheter, and intracorporeal electrohydraulic lithotripter [17]. These two patients were free of biliary symptoms for 1 and 2 years, respectively. Of 12 patients who had had the catheter removed after complete resolution of acute cholecystitis, 8 (67%) were asymptomatic for 1 month to 6 years (mean 2.0 years). Another four (33%) patients had recurrent cholecystitis 1 to 7 months (mean 3 months) after catheter removal, which resolved with a second percutaneous cholecystostomy. Two of the four patients underwent elective cholecystectomy without complications after cholecystostomy.

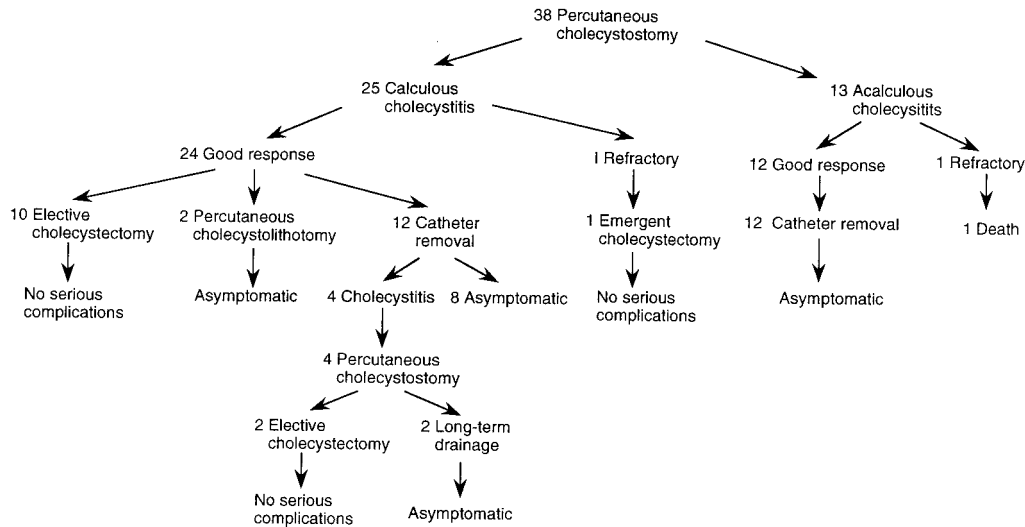


Fig. 1. Treatments and outcomes of acute cholecystitis in 38 elderly patients.

The two remaining patients had the cholecystostomy catheter left in situ for long-term drainage. They were asymptomatic for 3 and 5 months, respectively, until death due to underlying diseases. All 12 patients with acalculous cholecystitis who responded to cholecystostomy remained asymptomatic for 15 days to 6 years (mean 1.7 years) after catheter removal.

Discussion

In the present study, elderly patients (≥ 80 years) had a high incidence (21%) of severe acute cholecystitis associated with septic shock, respiratory distress, disseminated intravascular coagulation, or acute renal failure. Elderly patients had a high prevalence (34%) of acalculous cholecystitis, generally regarded as severe cholecystitis characterized by rapid evolution to gangrene and perforation [18]. Furthermore, 82% of the patients had coexisting chronic medical problems (e.g., bedridden state) and cardiovascular and neurologic diseases. These findings reflected the high-risk condition of elderly patients requiring management of acute cholecystitis.

The mortality rate associated with surgical treatment of acute cholecystitis in aged patients (≥ 65 years) reportedly ranges from 6% up to 46%, mostly around 15% [1–9]. Excellent results (mortality rate 0%) of early laparoscopic cholecystectomy for acute cholecystitis in aged patients has been reported [19]. In this report, however, the percentage of aged patients with acute cholecystitis who underwent laparoscopic surgery was not described. On the other hand, percutaneous cholecystostomy has been advocated as a safe, effective method for treatment of acute cholecystitis in patients who are critically ill or are high-risk surgical candidates. Morbidity and mortality rates related to this procedure are reportedly low: 0% to 4% and 0%, respectively [7–13].

In the present study, percutaneous cholecystostomy was successful in all 38 elderly patients. Adequate premedication and sedation during the procedure are essential to ensure safety. Elderly patients are often unable to hold their breath or to tolerate the procedure because they are critically ill or uncooperative. In this situation these procedures can be performed safely

and successfully under general anesthesia with endotracheal intubation.

Percutaneous cholecystostomy rapidly ameliorated the clinical symptoms of acute cholecystitis in 95% of our patients. Even severe cholecystitis with pericholecystic fluid collection [20] responded to this procedure. Percutaneous cholecystostomy for elderly patients was associated with low morbidity (3%) and mortality (3%) rates. The good results obtained in these high-risk elderly patients were consistent with previously reported results of percutaneous cholecystostomy for patients of all ages [7–13] and compared favorably with those of surgical treatment for aged patients [1–9].

We prospectively performed percutaneous cholecystostomy in all 38 of our elderly patients because of the established safety of this procedure. However, some cases of mild cholecystitis may be adequately managed with conservative treatment alone. If conservative treatment does not alleviate mild acute cholecystitis within 24 hours, urgent percutaneous cholecystostomy should be performed.

No bile leaks occurred after catheter removal in our series. Catheter removal should be deferred until approximately 20 days after placement when a mature track forms in critically ill patients [12].

After cessation of drainage, acute calculous cholecystitis relapsed in 33% of our elderly patients. The recurrence rate of acute calculous cholecystitis has been reported to be approximately 25% [9]. Therefore prophylactic treatment for recurrent acute cholecystitis after percutaneous cholecystostomy is advisable. Several treatment options are available for cholelithiasis after cholecystostomy. In patients who are not at particularly high risk, elective cholecystectomy can be performed safely after cholecystostomy has resolved the acute cholecystitis and the patient's general condition has improved. Reportedly, elective surgery (1–2%) has a lower mortality rate than emergent surgery (6–46%) for aged patients (≥ 65 years) with acute cholecystitis [1–9]. In elderly patients who are inappropriate surgical candidates because of severe concomitant systemic diseases or terminal malignancies, less invasive treatments, such as percutaneous cholecystolithotomy [14–17] and long-term gallbladder drainage [12], may pre-

vent recurrence. Expectant conservative management may be justified because percutaneous cholecystostomy is an excellent option for treating recurrent cholecystitis.

On the other hand, acalculous cholecystitis did not recur after cholecystostomy. For acalculous cholecystitis, cholecystectomy is not required and can be avoided, as previously reported [11, 13].

Conclusions

Elderly patients with acute cholecystitis are high-risk surgical candidates because of severe cholecystitis or concomitant medical problems. Percutaneous cholecystostomy is a simple, safe, effective treatment for acute cholecystitis in elderly patients. For calculous cholecystitis, percutaneous cholecystostomy may be followed by elective surgery, if possible, or by nonsurgical treatment or expectant conservative management in high-risk patients. For acalculous cholecystitis, cholecystostomy is a potentially definitive treatment, such that no further surgery is required.

Résumé

Chez le sujet âgé, la cholécystectomie en urgence pour cholécystite aiguë n'est pas dénuée de risques. Nous avons prospectivement évalué l'intérêt de la cholécystostomie percutanée transhépatique, guidée par l'échographie et la radioscopie chez 38 patients consécutifs de plus de 80 ans ayant une cholécystite aiguë (25 lithiasique, 13 alithiasique). Huit patients (21%) étaient dans un état grave (choc ou un syndrome de détresse respiratoire). Trente-et-un patients (82%) avaient une tare médicale sévère, le plus souvent cardio-vasculaire et/ou neurologique. La cholécystostomie a été effectuée avec succès chez les 38 patients. Une amélioration clinique rapide a été obtenue chez 36 (95%) patients. La morbidité et la mortalité ont été de 3%. Par la suite, 10 de ces patients ont eu une cholécystectomie électorale sans complications graves. Deux patients ont eu une ablation de calculs par voie percutanée, avec résolution complète des symptômes. Quatre des 12 patients lithiasiques et aucun des 12 patients alithiasiques ont eu une récurrence de leur cholécystite après ablation de leur cathéter de cholécystostomie pendant un suivi moyen de 1.8 ans. Une cholécystectomie secondaire a été réalisée avec succès chez ces quatre patients. Le sujet âgé représente un risque chirurgical en raison de la sévérité de l'infection et/ou des tares médicales. La cholécystostomie percutanée est sûre et effective dans la cholécystite, même chez le sujet très âgé. Dans la cholécystite lithiasique, la cholécystostomie peut être suivie de chirurgie électorale, lorsque possible, ou par un traitement non chirurgical ou encore par une période d'observation conservatrice chez le sujet à haut risque. Dans la cholécystite alithiasique, la cholécystostomie percutanée peut être le traitement définitif. Le traitement préventif produit la protéine HSP72 dans le foie de rat fibrotique et est responsable d'une tolérance accrue aux lésions de reperfusion d'ischémie chaude.

Resumen

La colecistectomía de urgencia por colecistitis aguda es un procedimiento de alto riesgo en pacientes de edad avanzada. Hemos estudiado el valor de la colecistostomía percutánea en la colecistitis aguda en un grupo de 38 pacientes de edad avanzada (< 80 años), consecutivos, que fueron con colecistitis aguda (25

calculosa, 13 acalculosa) sometidos a colecistostomía percutánea transhepática bajo guía ultrasonográfica y fluoroscópica. Ocho pacientes (21%), presentaban problemas médicos graves, tales como shock y dificultad respiratoria; 31 (82%) presentaban enfermedades cardiovasculares y neurológicas. La colecistostomía resultó exitosa en la totalidad de los 38 casos, lográndose prontamente mejoría en 36 (95%). Las tasas de morbilidad y mortalidad fueron 3% para ambas. Después de la colecistostomía, 10 pacientes con coledolitiasis fueron sometidos a colecistectomía electiva sin complicaciones serias. En dos pacientes se practicó colecistolitotomía percutánea, con resolución completa de los síntomas. Cuatro de los 12 que tenían coledolitiasis y ninguno de los 12 que no la tenían, exhibieron recurrencia de la colecistitis luego de la remoción del catéter en un seguimiento promedio de 1.8 años. Una segunda colecistostomía probó ser exitosa en estos cuatro casos. Los pacientes ancianos con frecuencia son malos candidatos para cirugía por razón de la colecistitis severa y/o los problemas médicos concomitantes. La colecistectomía percutánea es una forma de tratamiento segura y efectiva en la colecistitis aguda, aún en pacientes muy ancianos. En el caso de la colecistitis calculosa, la colecistostomía puede ser seguida por cirugía electiva, si es posible, o por tratamiento quirúrgico o manejo conservador expectante en los casos de alto riesgo. En la colecistitis acalculosa, la colecistostomía puede ser el tratamiento definitivo.

References

1. Glenn, F.: Surgical management of acute cholecystitis in patients 65 years of age and older. *Ann. Surg.* 193:56, 1981
2. Huber, D.F., Martin, E.W., Jr., Cooperman, M.: Cholecystectomy in elderly patients. *Am. J. Surg.* 146:719, 1983
3. Thorton, J.R., Heaton, K.W., Espiner, H.J., Eltringham, W.K.: Empyema of the gallbladder: reappraisal of a neglected disease. *Gut* 24:1183, 1983
4. Houghton, P.W., Jenkinson, L.R., Donaldson, L.A.: Cholecystectomy in the elderly: a prospective study. *Br. J. Surg.* 72:220, 1985
5. Markinen, A.M., Nordback, I.: Conventional cholecystectomy in elderly patients. *Ann. Chir. Gynaecol.* 82:241, 1993
6. Prousalidis, J., Fahadidis, E., Apostolidis, S., Katsolis, C., Aletras, H.: Acute cholecystitis in aged patients. *HPB Surg.* 9:129, 1996
7. Werbel, G.B., Narhrwold, D.L., Joehl, R.J., Vogelzang, R.L., Rege, R.V.: Percutaneous cholecystostomy in the diagnosis and treatment of acute cholecystitis in the high-risk patient. *Arch. Surg.* 124:782, 1989
8. Malone, D.E., Burhenne, H.J.: Advantages and disadvantages of the newer "interventional" procedures for the treatment of cholecystolithiasis. *Hepatogastroenterology* 36:317, 1989
9. Van Steenberg, W., Ponette, E., Marchal, G., Pelemans, W., Aerts, R., Fevery, J., De Groote, J.: Percutaneous transhepatic cholecystostomy for acute complicated cholecystitis in elderly patients. *Am. J. Gastroenterol.* 85:1363, 1990
10. Pearse, D.M., Hawkins, I.F., Shaver, R., Vogel, S.: Percutaneous cholecystostomy in acute cholecystitis and common duct obstruction. *Radiology* 152:365, 1984
11. Shirai, Y., Tsukada, K., Kawaguchi, H., Ohtani, T., Muto, T., Hatakeyama, K.: Percutaneous transhepatic cholecystostomy for acute acalculous cholecystitis. *Br. J. Surg.* 80:1440, 1993
12. Boland, G.W., Lee, M.J., Leung, J., Mueller, P.R.: Percutaneous cholecystostomy in critically ill patients: early response and final outcome in 82 patients. *A.J.R.* 163:339, 1994
13. Famulari, C., Marci, A., Galipo, S., Terranova, M., Freni, O., Cuzzocrea, D.: The role of ultrasonographic percutaneous cholecystostomy in treatment of acute cholecystitis. *Hepatogastroenterology* 43:538, 1996
14. Inui, K., Nakazawa, S., Naito, Y., Kimoto, E., Yamao, K.: Nonsurgical treatment of cholecystolithiasis with percutaneous cholecystoscopy. *Am. J. Gastroenterol.* 83:1124, 1988
15. Hurby, W., Stackl, W., Urban, M., Armbruster, C., Marberger, M.: Percutaneous endoscopic cholecystolithotripsy. *Radiology* 173:477, 1989

16. Picus, D., Hicks, M.E., Dacy, M.D., Vesely, T.M., Kleinhoffer, M.A., Aliperti, G., Edmundwicz, S.A.: Percutaneous cholecystolithotomy: analysis of results and complications in 58 consecutive patients. *Radiology* 183:779, 1992
17. Picus, D., Weyman, P.J., Marx, M.V.: Role of percutaneous intracorporeal electrohydraulic lithotripsy in the treatment of biliary tract calculi. *Radiology* 170:989, 1989
18. Johnson, L.B.: The importance of early diagnosis of acute acalculous cholecystitis. *Surg. Gynecol. Obstet.* 164:197, 1987
19. Lo, C.M., Lai, E.C.S., Fan, S.T., Liu, C.L., Wong, J.: Laparoscopic cholecystectomy for acute cholecystitis in the elderly. *World J. Surg.* 20:983, 1996
20. Kane, R.A.: Ultrasonographic diagnosis of gangrenous cholecystitis and empyema of the gallbladder. *Radiology* 134:191, 1980

Invited Commentary

James Toouli, M.B.B.S., Ph.D.

Department of Surgery, Gastrointestinal Surgical Unit, Flinders University of South Australia, Adelaide, South Australia, Australia

Acute cholecystitis in an old person with associated co-morbidity may result in high morbidity and mortality [1]. Surgical treatment via laparotomy has a reported mortality of up to 5%, with the mortality being largely related to the co-morbidity. Because of modern supportive care, the mortality from co-morbidities has improved [2]. However, in these patients cholecystectomy may be technically difficult during the acute phase owing to edema and florid inflammation associated with an underlying chronically inflamed and fibrotic gallbladder. Due to the patients' poor state, cholecystostomy or partial cholecystectomy has been recommended to decompress the inflamed gallbladder in the quickest and technically safest manner [3]. With advances in interventional radiologic techniques, it was not long before reports of percutaneous cholecystostomy for patients with severe co-morbidities appeared in the literature [4].

The study reported here by Sugiyama and colleagues describes a prospective review of treating 38 consecutive old patients with a clinical and radiologic diagnosis of acute cholecystitis by percutaneous transhepatic cholecystostomy under ultrasonographic and fluoroscopic guidance. As in other series, the patients had a variety of co-morbidities apart from their old age, including severe cardiorespiratory problems, neurologic disorders, or malignancy. Clinical improvement was demonstrated in 95% of the patients; and low morbidity (3%) and mortality (3%) rates were achieved. Fewer than 50% of the patients required further treatment of their gallbladder after successful resolution of the acute disease, and none of the patients with acalculous cholecystitis needed further treatment once the acute disease resolved and the percutaneous catheter was removed.

The authors have demonstrated in this prospective study that this minimal access "operation" is effective in helping to resolve an acute abdominal emergency, and in many patients it may be the only form of treatment necessary. This and other similar studies have shown that this approach to the acute treatment of cholecystitis is as effective as an open operative approach but can be achieved with minimal to no anesthesia and avoidance of an abdominal incision with its associated morbidity.

The transhepatic approach to the gallbladder is recommended, as it minimizes the risk of bile leakage. However, if it is not feasible owing to the anatomic position of the liver or a gallbladder on a mesentery, a direct caudal approach has also been shown to be feasible and is associated with minimal morbidity [5].

Once drainage has been established, it is expected that the patient's condition will improve rapidly. If the cystic duct is not patent, it may be anticipated that recurrent cholecystitis will occur after removing the drainage catheter. In these patients elective cholecystectomy should be considered. If the cystic duct is or becomes patent after resolution of the acute disease, the chance of further episodes of cholecystitis is not high, and an expectant management policy is appropriate.

As for other minimal access procedures, the applicability of this technique has been expanded. Lee et al. [6] reported the use of percutaneous cholecystostomy as a therapeutic trial for 24 critically ill patients with sepsis of unknown origin. In just over 50% of patients with acalculous gallbladder disease, cholecystostomy resulted in resolution of the disease. In the remaining patients who proved to have no evidence of gallbladder sepsis, a respiratory source for infection was subsequently demonstrated. Although this approach and indication differ from those of the patients presented in the study by Sugiyama et al., it supports their conclusions: percutaneous cholecystostomy is a simple, safe, effective treatment for acute cholecystitis in elderly patients.

References

1. Glen, F.: Surgical management of acute cholecystitis in patients 65 years of age and older. *Ann. Surg.* 193:56, 1981
2. Roslyn, J.J., Binns, G.S., Hughes, E.F., Saunders-Kirkwood, K., Zinner, M.J., Cates, J.A.: Open cholecystectomy: a contemporary analysis of 42,474 patients. *Ann. Surg.* 218:129, 1993
3. Kaufman, M., Weisberg, D., Schwarz, I., Moses, Y.: Cholecystostomy as a definitive operation. *Surg. Gynecol. Obstet.* 170:533, 1990
4. McGahan, J.P., Linfors, K.K.: Percutaneous cholecystostomy: an alternative to surgical cholecystostomy for acute cholecystitis. *Radiology* 173:481, 1989
5. Ferrucci, J.T., Kuligowska, F., Birkett, D.H.: Acute cholecystitis. In: *Hepatobiliary and Pancreatic Disease*, H.A. Pitt, D.L. Carr-Locke, J.T. Ferrucci, editors. Boston, Little Brown, 1995, pp. 219-227
6. Lee, M.J., Saini, S., Brink, J.A., Hahn, P.F., Simeone, J.F., Morrison, M.C., Rattner, D., Mueller, P.R.: Treatment of critically ill patients with sepsis of unknown cause: value of percutaneous cholecystostomy. *A.J.R.* 156:1163, 1991