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# Percutaneous Cholecystostomy in Critically Ill Patients

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**Abstract.** Sixteen critically ill patients underwent percutaneous cholecystostomy because of suspected acute cholecystitis. The procedure was technically successful, although 11 of 16 patients died subsequently because of various complications of their underlying primary disorders. We reviewed this series to reassess the value of percutaneous cholecystostomy. Four of 11 patients with definite acute cholecystitis (group 1) were cured by this technique, but three required surgery because of gallbladder wall necrosis. Two of these were among four cases which had demonstrated pericholecystic fluid collections on computed tomography (CT) or ultrasound of the abdomen. There were also five patients (group 2) in whom acute cholecystitis or its relationship to patients' symptoms were not fully determined, and four of them did not improve after percutaneous cholecystostomy. We conclude that this technique has a lower success rate in critically ill patients than reported previously.

**Key words:** Gallbladder, interventional techniques – Cholecystitis, diagnosis – Percutaneous cholecystostomy, complications.

Although percutaneous cholecystostomy is now used to gain access to the gallbladder for a variety of interventional procedures, one of its principal applications is the treatment of acute cholecystitis, especially in patients who are too ill for emergency cholecystostomy. The ease of performing percutaneous cholecystostomy, which can be performed at the bedside, the high technical success rate, and the low complication rate, generally make it comparable or even preferable to surgical cholecystostomy [1].

The purpose of this paper is to report a series of 16 patients with suspected acute cholecystitis who were not candidates for cholecystostomy and who were treated by percutaneous cholecystostomy.

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## Materials and Methods

Sixteen patients were treated by percutaneous cholecystostomy for suspected acute cholecystitis. The ages ranged from 31–81 years, with a mean of 64. All patients were considered too sick for cholecystostomy by the referring surgical and/or medical services. Two patients had gallbladder stones and the remaining 14 were considered to have acalculus cholecystitis. All patients were hospitalized. All but one patient were being treated for other concomitant underlying disease processes, and many had several other disease processes. Fifteen of 16 patients were septic with positive blood cultures. In seven patients there was no significant delay before acute cholecystitis was considered a possible source of infection and before the interventional radiologist was consulted. Four patients were septic for 2–5 weeks before acute cholecystitis was a consideration, the rest for less than 2 weeks.

We divided the patients into two groups. Group 1 consisted of 11 patients who had definite acute cholecystitis documented by definitive imaging studies, clinical follow-up, or by surgical confirmation. Definitive imaging studies consisted of a computed tomographic (CT) scan or ultrasound that showed an enlarged or enlarging gallbladder with thickened wall ($>3$ mm), the presence of pericholecystic fluid, or internal echogenic material suggestive of empyema. Clinical follow-up consisted of marked improvement or cure after placement of the cholecystostomy catheter, and surgical confirmation consisted of visual or histological confirmation of acute cholecystitis or necrosis of the gallbladder wall. Group 2 consisted of five patients in whom it was not possible to determine if cholecystitis was a contributing factor to their sepsis, although imaging studies (nuclear medicine, CT, and ultrasound) were suggestive. Suggestive studies consisted of an enlarged gallbladder, sludge or gallstones, and nonvisualization of the gallbladder on nuclear medicine scans.

Ultrasound guidance was utilized for localization of the gallbladder. With a single wall puncture through the right anterior axillary region, the Seldinger exchange technique was employed. Fluoroscopic guidance was then utilized to sequentially dilate the tract for drainage catheter placement. A 6- to 10-French catheter was used for drainage of the gallbladder. The size of the catheter was determined by the viscosity of the aspirated fluid. In recent cases a locking loop catheter was used to secure the catheter within the gallbladder, but no anchoring system was incorporated to pull the gallbladder next to the adjacent liver or abdominal wall. Also no consistent attempt was made to traverse a segment of liver parenchyma.

## Results

A cholecystostomy catheter was successfully inserted in all 16 patients. In one patient we encountered technical difficulty inserting the catheter. The needle and guidewire were easily inserted, but the final catheter became dislodged twice before it was properly placed. In this patient, injection of contrast revealed extravasation into a previously documented pericholecystic fluid collection, which also extended into the right paracolic gutter. In addition to the cholecystostomy tube, a drainage catheter was inserted into the fluid collection. We encountered no hemobilia or vasovagal reactions.

Eleven of the 16 patients (69%) eventually died, but no death was considered procedure-related. Nine died during hospitalization and two died several months later, with the cholecystostomy catheter still in place. In the latter two cases, the cystic duct was occluded by tumor. No autopsies were obtained.

In group 1, four (36%) patients were cured. Seven patients in group 1 died. One of these seven had improved following percutaneous cholecystostomy but had chronic cardiac disease and finally succumbed to congestive heart failure; three of the remaining six who died improved transiently after percutaneous cholecystostomy, but subsequently relapsed and underwent surgery, which revealed necrosis of at least part of the gallbladder wall; and three of the six never recovered from sepsis (two of these had empyema and one had severe liver failure). In group 2, four patients showed no improvement following percutaneous cholecystostomy. These patients had several potential sources of sepsis. One patient improved, but had been improving gradually prior to percutaneous cholecystostomy.

Four of the patients in Group 1 had pericholecystic fluid collections on ultrasound or CT (Figs. 1 and 2). Only one of the four survived. Of the three patients in group 1, who were taken to surgery and found to have gallbladder wall necrosis, two had pericholecystic fluid collections and one did not.

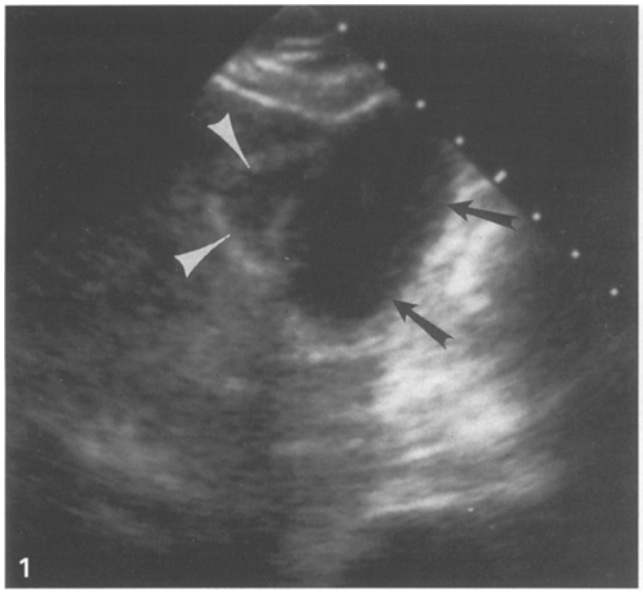


**Fig. 1.** Ultrasound of the liver shows a distended gallbladder (*arrows*) and a pericholecystic fluid collection (*arrowheads*) in a 77-year-old man with bladder cancer, hypertension, and recent myocardial infarction, who had developed sepsis while comatose and on a ventilator. Following percutaneous cholecystostomy his fever and white blood count decreased, but he remained comatose and died.

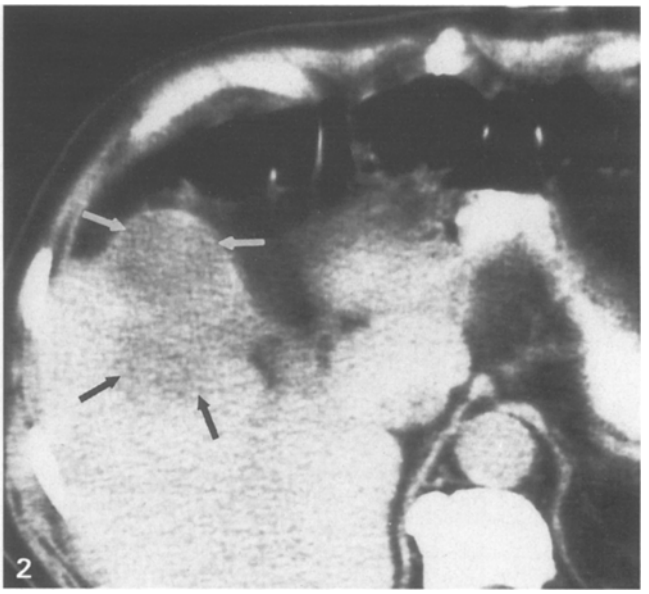


**Fig. 2.** CT scan shows an intrahepatic fluid collection (*black arrows*) adjacent to the gallbladder (*white arrows*) in an 81-year-old man who was septic and comatose. During percutaneous cholecystostomy pus was obtained from the gallbladder, but his fever and leukocystosis persisted. At surgery he was found to have a gangrenous gallbladder, and he died postoperatively.

## Discussion

Although our technical success rate and complication rate compare favorably with the literature [2, 3], our cure rate for acute cholecystitis by percutaneous cholecystostomy is only 36%, considerably lower than most reported series [2–8]. This low clinical success rate can be attributed to multiple factors. In group 2 (five patients), it was not possible to definitively establish the diagnosis of acute cholecystitis even though imaging studies, such as nuclear medicine scans or ultrasound, were consistent with the diagnosis. This group of patients may well have had acute cholecystitis, but since they had several other potential sources of infection, gallbladder decompression did not alter their clinical course. McGahan and Lindfors [1] reported similar difficulty in diagnosing and treating cholecystitis in this type of patient. Many of the patients in group 1 also were critically ill with multiple additional problems. The fact that 11 of 16 patients died unrelated to the percutaneous cholecystostomy procedure attests to the critical conditions of these patients. Others have reported similar mortality rates in this patient population [1, 9]. In both groups there was often a delay in both considering the gallbladder as a source of infection and in consulting the interventional radiologist. This delay may have contributed to our low success rate.

Although pericholecystic fluid on CT or ultrasound is an important diagnostic sign of acute cholecystitis, it seemed to indicate, in our small series of four patients, that there is necrosis of at least part of the gallbladder wall. This was confirmed surgically in two patients with pericholecystic fluid. Smith and coworkers [10] reported similar findings in a series of 13 patients with cholecystitis who underwent surgery and had pericholecystic hepatic activity on nuclear medicine scans. Our cure rate by percutaneous cholecystostomy in this subgroup of patients was only one of four (25%). However, all three of these patients did improve transiently. Vogelzang and Nemcek [11] also reported a failure in a patient with a necrotic gallbladder wall.

Since percutaneous cholecystostomy is a safe and simple procedure, which even can be performed at the bedside, we believe it should be used to treat acute cholecystitis in patients who are candidates for cholecystostomy rather than cholecystectomy. We suggest that earlier awareness and action may help increase the success rate. In addition, we suggest that pericholecystic fluid may indicate gallbladder wall necrosis. In the presence of pericholecystic fluid, the radiologist and referring physician should be aware that percutaneous cholecystostomy may not cure the cholecystitis but may stabilize the patient sufficiently to permit a safer cholecystectomy.

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