

The safety and efficacy of percutaneous transhepatic gallbladder drainage in elderly patients with acute cholecystitis before laparoscopic cholecystectomy

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Purpose: Laparoscopic cholecystectomy (LC) is the standard management for acute cholecystitis. Percutaneous transhepatic gallbladder drainage (PTGBD) may be an alternative interim strategy before surgery in elderly patients with comorbidities. This study was designed to evaluate the safety and efficacy of PTGBD for elderly patients (>60 years) with acute cholecystitis.

Methods: We reviewed consecutive patients diagnosed with acute cholecystitis between January 2009 and December 2013. Group I included patients who underwent PTGBD, and patients of group II did not undergo PTGBD before LC.

Results: All 116 patients (72.7 ± 7.1 years) were analyzed. The preoperative details of group I (n = 39) and group II (n = 77) were not significantly different. There was no significant difference in operative time (P = 0.057) and intraoperative estimated blood loss (P = 0.291). The rate of conversion to open operation of group I was significantly lower than that of group II (12.8% vs. 32.5%, P < 0.050). No significant difference of postoperative morbidity was found between the two groups (25.6% vs. 26.0%, P = 0.969). In addition, perioperative mortality was not significantly different. Preoperative hospital stay of group I was significantly longer than that of group II (10.3 ± 5.7 days vs. 4.4 ± 2.8 days, P < 0.050). However, two groups were not significantly different in total hospital stay (16.3 ± 9.0 days vs. 13.4 ± 6.5 days, P = 0.074).

Conclusion: PTGBD is a proper preoperative management before LC for elderly patients with acute cholecystitis. [Ann Surg Treat Res 2015;89(2):68-73]

Key Words: Laparoscopic cholecystectomy, Percutaneous transhepatic gallbladder drainage, Acute cholecystitis

INTRODUCTION

Open cholecystectomy was the standard treatment for symptomatic cholecystitis until the advent of laparoscopic cholecystectomy (LC) in the late 1980s and early 1990s. Acute cholecystitis was a contraindication for laparoscopic treatment because inflammation and edema made LC difficult [1].

However, accumulated experience and advanced laparoscopic techniques have made LC equivalent to or better than open

cholecystectomy for acute cholecystitis [2,3]. The appropriate timing of LC has been controversial until now. In the late 1990s, two randomized trials of early versus delayed LC showed that urgent procedures were safe compared with delayed surgery with respect to the low rate of postoperative complications and conversion [4,5]. Many studies have reported that if this procedure is performed between 48 and 96 hours from symptomatic onset, the operative difficulty and conversion rate are lower than those of delayed operation [6].

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In elderly patients with comorbidities, LC can result in serious morbidity and mortality compared with younger patients [7,8]. In very elderly patients (≥ 80 years), it is associated with higher open-conversion rate than those of younger patients [9].

Percutaneous cholecystostomy followed by interval LC was regarded as safe management for pain relief from acute inflammation and a minimally invasive approach that could be employed safely in critically ill patients when difficulty of early operation existed [10].

In the same context, percutaneous transhepatic gallbladder drainage (PTGBD) may be an alternative interim treatment before LC for acute cholecystitis. The aim of this study was to evaluate the safety and efficacy of PTGBD for elderly patients who had developed acute cholecystitis.

METHODS

Patients

We retrospectively reviewed all consecutive patients (>60 years) with acute cholecystitis proved by histopathology of gallbladder specimen in Chosun University Hospital between January 2009 and December 2013. The definition of acute cholecystitis is the state of acute inflammation with or without stone. It manifests with right upper quadrant pain, fever and leukocytosis. We reviewed all patients diagnosed with acute cholecystitis based on clinical signs and image studies such as sonography or CT. The patients were divided into two groups. Group I was treated with PTGBD before LC and group

II was not. We analyzed the patients' preoperative data such as age, sex, American society of Anesthesiologists (ASA) score, previous operation history, laboratory findings, postoperative complications, morbidity, mortality and hospital stay. We also measured operative time, blood loss and the rate of conversion to open surgery.

PTGBD procedure and patient selection

The PTGBD procedure was performed under local anesthesia using ultrasonography by an interventional radiologist. Fluoroscopy followed to confirm the guide-wire placement in the gallbladder, and one of 8- to 10-French pigtail catheters was used. The transhepatic approach was preferred in our cases. We performed PTGBD for patients who had suffered from severe abdominal pain, tenderness or fever originating from distension and gangrenous change of gallbladder, but not ruptured in radiologic findings. Also, laboratory findings showed inflammation such as leukocytosis representing acute cholecystitis.

Operative technique

Conventional LC was started with 3 trocars insertion. A 12-mm trocar was placed in a subumbilical incision. Five-millimeter trocars were placed in the upper midline and subcostal region in the right midclavicular line individually. LC should be converted to open cholecystectomy when severe adhesion and fibrosis around gallbladder progressed, because the adjacent structures are likely to be injured. When complete dissection

Table 1. Demographic characteristics of patients

Characteristic	Group I (n = 39)	Group II (n = 77)	P-value
Age (yr)	72.95 \pm 7.49	72.55 \pm 7.00	0.775
Sex			
Male:female	25:14	47:30	0.647
Comorbid conditions	35 (82.1)	72 (93.5)	0.102
Heart disease	11 (28.2)	22 (28.6)	0.967
Lung disease	9 (23.1)	28 (36.4)	0.147
Diabetes mellitus	16 (41.0)	22 (28.6)	0.177
End-stage renal disease	2 (5.1)	3 (3.9)	>0.999
Liver cirrhosis	1 (2.6)	2 (2.6)	>0.999
Hypertension	21 (53.8)	42 (54.5)	0.943
CVA history	7 (17.9)	11 (14.3)	0.607
ASA score			
3–4	13 (33.3)	10 (13.0)	0.009
Abdominal operation history	8 (20.5)	16 (20.8)	0.973
WBC (cells/mm ³)	11,850 (8,090–16,610)	11,270 (8,960–15,560)	0.613
AST (U/L)	33 (21–46)	26 (20–36)	0.065
ALT (U/L)	21 (15–39)	17 (13–33.50)	0.356
Total bilirubin (mg/dL)	1.11 (0.71–1.79)	0.97 (0.74–1.70)	0.429

Values are presented as mean \pm standard deviation, number (%) or median (range).

Group I, PTGBD group; Group II, Non-PTGBD group; PTGBD, percutaneous transhepatic gallbladder drainage; ASA, American Society of Anesthesiologists physical status classification; CVA, cerebrovascular accident.

Table 2. Comparison of surgical results of operation

Variable	Group I (n = 39)	Group II (n = 77)	P-value
Operative time (min)	105 (60–130)	120 (85–157.50)	0.057
Estimated blood loss (mL)	100 (30–250)	100 (30–300)	0.291
Conversion to open	5 (12.8)	25 (32.5)	0.022
Common bile duct injury	0 (0)	2 (2.6)	0.556
Perioperative mortality	1 (2.6)	3 (3.9)	>0.999
Hospital stay (day)			
Preoperative	10.31 ± 5.75	4.49 ± 2.89	<0.001
Postoperative	6.08 ± 5.27	8.94 ± 5.98	0.013
Total	16.38 ± 9.02	13.43 ± 6.56	0.074

Values are presented as median (range), number (%) or mean±standard deviation.

Group I, PTGBD group; Group II, Non-PTGBD group; PTGBD, percutaneous transhepatic gallbladder drainage.

was not possible to achieve, open cholecystectomy was done. In such case, a subcostal incision was done along the extended line between the 5-mm trocars.

Statistical analysis

PASW Statistics ver. 18.0 (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. The chi-square and Fisher exact tests were used for analysis of categorical variables. The Student t and Mann-Whitney U-tests were applied for continuous variables. The values of $P < 0.05$ were considered statistically significant in our study.

RESULTS

Preoperative characteristics

A total of 233 patients were diagnosed with acute cholecystitis. Of these patients, 145 patients were over 60 years old. Twenty-nine patients who underwent endoscopic retrograde cholangio-pancreatography for the management of suspicious common bile duct stones shown in CT were excluded. Accordingly, 116 patients with acute cholecystitis could undergo laparoscopic or open cholecystectomy. Group I consisted of 39 patients, who had improved symptoms, laboratory findings, and general condition by PTGBD before operation (Data not shown). Group II consisted of 77 patients, who were managed with conservative treatments without PTGBD and then underwent cholecystectomy. In this study, there were 72 male and 44 female patients with a mean age of 72.7 ± 7.1 years. Significant difference between the groups was not found in the ratio of male/female and mean age ($P = 0.647$ and $P = 0.775$, respectively). In total, 104 patients in both groups had comorbidities before the operations (82.1% vs. 93.5%, $P = 0.102$). Heart diseases included angina, myocardial infarction, and atrial fibrillation. Lung diseases included pleural effusion, pneumonia, history of tuberculosis, and chronic obstructive pulmonary disease. Comorbidities were not significantly different between the groups. However, the ratio of ASA 3 to

Table 3. Comparison of postoperative complications

Variable	Group I (n = 39)	Group II (n = 77)	P-value
No. of patients	10 (25.6)	20 (26.0)	0.969
Intra-abdominal abscess	2 (5.1)	6 (7.8)	0.716
Lung complications	5 (12.8)	5 (6.5)	0.300
Operative site bleeding	1 (2.6)	1 (1.3)	0.621
Bile leakage	3 (7.7)	3 (3.9)	0.402
Wound dehiscence	2 (5.1)	7 (9.1)	0.716
Postoperative ileus	0 (0)	2 (2.6)	0.550

Values are presented as number (%).

Group I, PTGBD group; Group II, Non-PTGBD group; PTGBD, percutaneous transhepatic gallbladder drainage.

4 of group I was significantly higher than that of group II ($P < 0.050$) (Table 1).

Surgical results of operation

No significant differences between the two groups were found in operative time ($P = 0.057$) and intraoperative blood loss ($P = 0.291$). The conversion rate of group I was significantly lower than group II (12.8% vs. 32.5%, $P < 0.050$). PTGBD is not significantly correlated with perioperative mortality (2.6% vs. 3.9%). All cases of mortality resulted from septic shock. Bile duct injury during LC did not occur in group I, but occurred in two patients in group II without significant difference ($P = 0.556$). The preoperative hospital stay in group I was significantly longer than that in group II (10.31 ± 5.75 days vs. 4.49 ± 2.89 days, $P < 0.050$). In contrast, the postoperative hospital stay of group I was significantly shorter than that of group II (6.08 ± 5.27 days vs. 8.94 ± 5.98 days, $P = 0.013$). There was no significant difference in total hospital stay (16.38 ± 9.02 days vs. 13.43 ± 6.56 days, $P = 0.074$) (Table 2).

Postoperative complication

The postoperative complication rates of the two groups were not significantly different (25.6% vs. 26.0%, $P = 0.969$).

Group I showed no complications related to PTGBD, such as dislodgement, bleeding, or bile leakage. However, both groups I and II developed intra-abdominal abscess, lung complication, hemorrhage, wound dehiscence, and bile leakage during the postoperative period. The postoperative complication rates of two groups were not different (Table 3).

DISCUSSION

There have been many disputes about the safety and efficacy between delayed cholecystectomy after nonsurgical management and early cholecystectomy for acute cholecystitis. In the present study, we evaluated the safety and efficacy of PTGBD for acute cholecystitis of elderly patients. The preoperative data for the PTGBD and non-PTGBD groups were not significantly different except the rate of patients with ASA 3 to 4. Although the two groups had no difference in the number of patients with comorbidities, we speculate that the higher ratio of patients with ASA 3 to 4 in the PTGBD group resulted from worse and more concurrent comorbidities relative to those of the non-PTGBD group. PTGBD can allow the relatively ill patients to undergo operation without the increase of postoperative complication and mortality.

The group with delayed LC following PTGBD showed no drawback in the aspects of operation time, blood loss volume, postoperative complications, mortality, and total hospital stay. Moreover, the conversion rate to open cholecystectomy of the PTGBD group was lower than that of non-PTGBD group. Although LC was performed after the "golden 72 hours" in the PTGBD group, the low conversion rate similar to that of previous studies can be attributable to PTGBD [2,11].

The preoperative hospital stay of PTGBD group was longer than that of non-PTGBD group. On the contrary, postoperative hospital stay of PTGBD group was significantly shorter. Although the total hospital stay of the two groups was not different, we think that the greater frequency of conversion surgeries in non-PTGBD group obviated the postoperative early recovery and discharge.

In a previous study, when the patient was diagnosed with acute cholecystitis, LC had to be performed within three days from symptomatic onset. Furthermore, early LC can reduce conversion rate and total hospital stay, resulting in significant medical and economic benefits [12]. In addition, this previous study found that 20% of postoperative complications could be reduced to 8% in early cholecystectomy within 72 hours. Another previous study suggested that initial conservative treatment followed by delayed operation could not diminish the morbidity and conversion rate for acute cholecystitis [5]. These studies showed that the root cause of conversion was a repetitively progressive inflammation, which was accompanied by distended and edematous walled gallbladder, precluding

easy and safe laparoscopic dissection [5,13]. However, we have some limitations of keeping these aforementioned results. In these studies, early cholecystectomy was compared with delayed cholecystectomy without any bridging treatment such as PTGBD. Delayed cholecystectomy was performed after only medical treatment without any palliative intervention. Also, these studies described that the technique of intraoperative decompression for an edematous gallbladder should be commonly used for the safe dissection and prevention of infected bile spillage [13]. However, now it can be performed preoperatively, like with PTGBD. As a result, operation time could be shortened and bile spillage could be prevented easily.

PTGBD has shown some advantages such as relief of symptoms and inflammation, and successful outcomes [14]. Acute calculus cholecystitis is a common disease caused by obstruction of the cystic duct with stone. Acute inflammation usually starts with the distension of the gallbladder and an edematous change of the wall. Subsequently, acute cholecystitis may gradually progress to be complicated by empyema, perforation, abscess formation, peritonitis, and sepsis. Complicated cholecystitis could occur more commonly in compromised elderly patients who are susceptible to inflammation. In critically ill elderly patients, the placement of a percutaneous cholecystostomy tube allows the patients with comorbidities to recover from the acute illness before proceeding to cholecystectomy [14-16]. Because elective surgery is safer than emergent surgery, conservative treatment has been suggested to stabilize patients until elective surgery [17]. Surgical cholecystostomy has also been proposed as an alternative to medical treatment or cholecystectomy in order to avoid emergent open surgery [18]. Since the first percutaneous drainage procedure for gallbladder empyema was performed by Radder in 1980, it has become a useful alternative treatment to surgery in operative high-risk patients with acute cholecystitis [19,20]. Percutaneous drainage seems to be a safe procedure in patients who are incompatible for operation [21-23]. Furthermore, it has been suggested as a less invasive procedure with low morbidity and mortality rates compared with open cholecystectomy in critically ill patients [24,25].

PTGBD has been used increasingly as a diagnostic and therapeutic procedure with almost 100% technical success [19]. It is a safe and less invasive method of treatment with a reported procedure-related mortality rate of 0%–4% [20,26,27]. PTGBD failure is mainly associated with catheter dislodgement and bile leakage, but severe complications are rare [20,26,28]. The transhepatic approach through the bare area of the gallbladder may be superior to the transperitoneal approach, with a lower risk of catheter dislodgement, bowel injury, and bile peritonitis [16]. In our study, the transhepatic approach was chosen for all patients in the PTGBD group, and no patient experienced complications related to this procedure.

In conclusion, we found that LC after PTGBD could be per-

formed with low conversion rate for ill elderly patients. After PTGBD, preoperative hospital stay may increase, however, the total hospital stay does not significantly increase. PTGBD is considered to have an effect of drainage on acute inflammation of the gallbladder and enables LC to be performed safely without the adjacent duct or organ injury.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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