European Geriatric Medicine 8 (2017) 315–319

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www.sciencedirect.com

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EM|consulte
www.em-consulte.com/en

Research paper

Percutaneous cholecystostomy for acute cholecystitis in elderly patients with comorbidities: Long-term outcomes after successful treatment and the risk factors for recurrence

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ARTICLE INFO

Article history:
Received 1st March 2017
Accepted 28 April 2017
Available online 31 May 2017

Keywords:
Cholecystitis
Cholecystostomy
Interval cholecystectomy
Drainage
Percutaneous
Complications

ABSTRACT

Background/Aim: Percutaneous cholecystostomy (PC) has been effectively used for the treatment of acute cholecystitis (AC) for patients unfit for early cholecystectomy. This study investigates the recurrence rate after successful PC and factors associated with recurrence.
Patients and methods: This was a retrospective descriptive review of the medical records of 71 patients that underwent PC for AC at a single institution between 2000 and 2016. Primary outcome was relief of cholecystitis and need for later cholecystectomy after successful PC. Secondary outcomes were hospital stay, catheter dwell-time, catheter problems and complications following the procedure. We used multivariable logistic regression analysis sequentially to identify factors associated with each outcome.
Results: PC was initially successful and symptoms disappeared within 96 hours in all patients. In total, 67 of 71 (94.4%) patients had recovered by PC only and were discharged. During follow-ups, 7 patients succumbed to their underlying diseases (unrelated to AC) and they were not included into analyses since they did not survive one year after successful intervention. The one-year recurrence rate was 23.3% (14/60). Perforation of the gallbladder, presence of bile duct stones, C-reactive protein, hospital stay and catheter dwell-time positively correlated ($P < 0.05$) with one-year recurrence. Hospital stay and catheter dwell-time were 16.8 ± 6.3 and 19.1 ± 9.8 days, respectively.
Conclusion: Patients with AC were promptly relieved from their symptoms following PC. The one-year recurrence rate was relatively low after successful PC. Predictors for recurrence included the severity of initial AC and subsequently provided treatments.

1. Introduction

Cholecystectomy has been the standard treatment for acute cholecystitis (AC) in the acute phase. With the advancement of laparoscopic cholecystectomy (LC), early surgery is now considered safe and effective for the management of AC [1–3]. However, in the elderly and multi-morbid patients, early cholecystectomy could result in serious morbidity and high perioperative mortality, far higher than with cholecystectomy carried out in the elective setting. Initial non-operative treatment, including antibiotic treatment and percutaneous cholecystostomy (PC), is proposed for high-risk patients as a minimally invasive, alternative management aiming to prevent perioperative morbidity [2–5].

With the application of PC, the gallbladder is decompressed until the inflammatory process has subsided. After resolution of AC, according to reports, it is desirable to perform elective LC to prevent recurrence at 6–8 weeks after resolution of the initial AC [6,7]. However, some researchers suggest that PC might not only serve as a bridge to interval cholecystectomy but could be a definitive treatment for AC, especially for patients with high operative risk [8–11]. Some studies have questioned this statement and even shown that the results are equivalent or even better if cholecystectomy is performed early [12–15].

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http://dx.doi.org/10.1016/j.eurger.2017.04.013
1878-7649/

The purpose of this retrospective study was to evaluate the efficacy of PC with the aim to investigate the one-year recurrence rate and factors associated with recurrence after successful PC in critically ill patients.

2. Patients and methods

2.1. Design and setting

A retrospective analysis was performed on all patients who were consecutively admitted and underwent PC at our hospital between January 2000 and December 2016.

2.2. Patient selection and data collection

Patients were selected for PC if they were deemed high-risk for emergency cholecystectomy due to their poor general condition caused by acute systemic complications or an underlying comorbidity. Indications for PC were based on the experienced multidisciplinary team clinicians' discretion. Before data collection, the Institutional Review Board of our hospital approved this study (No. 04-09/2-14/17) and waived the requirement for informed consent due to the study's retrospective design.

2.3. Measurements

The diagnosis of AC was made based on clinical and laboratory findings according to the following diagnostic criteria: patients should have had right upper abdominal quadrant pain and/or a positive Murphy sign, a sign of systemic inflammation being either fever ($> 38\ ^{\circ}C$) or history of having had fever in the preceding days, or elevated infection parameters (C-reactive protein and/or white blood count). The clinical diagnosis was confirmed by either ultrasound (US) or computed tomography (CT) scan of the abdomen showing a thickened gallbladder wall, gallbladder distension and presence of sludge formation and/or concrements in the gallbladder.

Patient characteristics including gender, age, comorbidity, American Society of Anesthesiologists (ASA) classification, Tokyo classification, duration of symptoms and laboratory data were documented.

2.4. Patient management

All patients received initial treatments that included intravenous fluids, nasogastric aspiration, analgesics, and antibiotics. If there was no clinical and laboratory improvement, patients considered unfit for surgery underwent PC. Procedure was carried out under ultrasound guidance, using local anesthesia, with careful localization of the gallbladder bed and proper selection of the entry site. An optimal access to gallbladder bed was via transperitoneal route or transhepatic approach through the right lobe. The applied drainage technique was the trocar method using 8F multisidehole pigtail catheter (Boston Scientific, Boston, USA), which was introduced into the gallbladder bed. Aspiration was then performed with the catheter until no more content could be removed. The catheter was then secured to the skin for continuous external drainage and left in-situ until it stopped producing any content. The catheter was flushed daily with 5–10 mL of sterile saline to prevent occlusion. When a catheter problem occurred, it was resolved by repositioning and flushing of the catheter or by introducing a new one. All interventions were performed by sole, experienced operator (EZ). After the resolution of AC, the catheter was removed if biliary symptoms did not reoccur after the catheter was temporarily clamped. Cholecystocholangiography was performed prior to catheter removal in order to observe the bile tree and gallbladder. This procedure was not performed in patients, who did not give their consent or those difficult for mobilization. Once stable, patients with choledocholithiasis were treated by endoscopic retrograde cholangiopancreatography (ERCP), following the PC.

After the removal of the catheter patients were followed up by physical examination and ultrasonography. Elective cholecystectomy using LC was performed in the case of recurrent biliary symptoms. In the event of complications during LC the procedure was converted to open cholecystectomy.

2.5. Outcome measures

The primary outcome measure was recurrence of AC and need for interval cholecystectomy within one year after successful PC and resolution of cholecystitis. Secondary outcomes were: hospital stay, catheter dwell-time, catheter problems, overall morbidity, and mortality.

2.6. Statistical analysis

Statistical analysis was done using statistical software SPSS 20.0. Categorical data were expressed as counts and proportions; continuous data were expressed as means and standard deviations. A value of $P < 0.05$ was considered as indicative of significance. We selected the odds ratio (OR) as the outcome measure. Multivariable logistic regression analyses were conducted sequentially to examine the association between independent variables and outcomes. All available variables were considered in the regression model, regardless of whether they were found significant by univariate analysis.

3. Results

During the study period a total of 71 patients with a mean age of 72.9 ± 8.6 years had a PC due to AC. Overall hospital mortality was 3 out of 71 patients (4.2%). These patients, who had no catheter problems, succumbed as the result of their underlying diseases. On the tenth day after PC, one patient was transferred to surgery and underwent LC upon own request. During follow-ups, 7 patients succumbed to their underlying diseases and died of reasons unrelated to AC (2 patients died due to cerebral hemorrhage, 4 due to advanced malignancy and one due to chronic renal failure). Since the cause of death was unrelated to AC and they succumbed to their underlying diseases and they did not survive one year after PC, these patients were not included into analysis.

Finally, 60 patients were included in further analysis. Fifty-four patients (90%) had calculous and 6 (10%) had acalculous cholecystitis as evaluated by US or CT before PC. Sixteen patients (26.7%) had a perforation of the gall bladder. Indications for PC instead of surgery were age and/or comorbidity in 43 (71.7%) patients, acute systemic complications relating to cholecystitis in 6 (10%) and both in 11 (18.3%) patients. Insertion of the drain was performed median 2 (range 1–7) days after the hospital admittance. Patients' characteristics are shown in Table 1.

Insertion of the drain was technically successful in all patients, and no serious complications were attributed directly to the procedure. After insertion of the drain some patients complained of abdominal pain. This was thought to be related to minor bile leakage and pain was easily relieved by analgesics. Resolution of symptoms occurred in all patients. Significant reductions in white blood count (WBC), and C-reactive protein (CRP) were observed within the 96 hours of the procedure (Table 2).

Macroscopic drainage of pus was reported in 21 patients. *Escherichia coli* were the only bacteria in 25, *Staphylococcus aureus*