

**ARAŞTIRMA / RESEARCH****Treatment with ultrasound guided percutaneous cholecystostomy in acute cholecystitis: 10-year a single-center experience**

Akut kolesistit tedavisinde perkütan kolesistostomi: 10-yıllık tek merkez deneyimi

Müge Yıldırım¹, Utku Mahir Yıldırım², Umut Özzyer³¹Gaziemir Nevvar Salih Isgoren State Hospital, Department of Radiology. İzmir, Turkey²Medical Park İzmir Hospital, Department of Radiology. İzmir, Turkey;³Baskent University Faculty of Medicine, Department of Radiology. Ankara, Turkey*Cukurova Medical Journal 2017;42(3):465-469***Abstract****Purpose:** Evaluating the technical success, clinical outcomes and safety of ultrasound-guided percutaneous cholecystostomy (PC) in patients with acute cholecystitis.**Material and Methods:** Medical records of patients diagnosed as acute cholecystitis and treated with PC from year 2000 to 2011 were retrospectively examined. ASA scores, leukocyte counts, gall stone presence, bile cultures, additional interventions, interval surgery, procedure-related complications and mortality were reviewed.**Results:** PC catheters were placed in 127 patients (72 male, 55 female) aged from 31 to 100 years. Technical success of the procedure was 100%. Clinical success was obtained in 86% of the patients. No procedure related mortality or early major complications were observed. Minor complication rate was 7% (9/127) and late major complication rate was 3% (4/127). Thirty day in-hospital mortality rate was 8% (10/127). Six patients died after interval cholecystectomy and 4 patients died before the operation. PC served as a definitive treatment in 74% (17/23) of the patients with acalculous cholecystitis. Fifty-eight percent (31/53) of the patients with acute calculous cholecystitis were treated only with percutaneous cholecystostomy and only 10% (3/31) had recurrent cholecystitis in follow up.**Conclusion:** PC can be preferred over primary cholecystectomy in acute cholecystitis patients. The procedure has high technical success, high clinical response and low complication rates. It can also serve as a definitive treatment option in patients with high surgical risk.**Key words:** Interventional radiology, ultrasonography, acute cholecystitis, cholecystostomy.**Öz****Amaç:** Akut kolesistitli hastalarda ultrasonografi kılavuzluğunda perkütan kolesistostomi (PK) işleminin teknik başarısı, klinik sonuçları ve güvenilirliğini değerlendirmek.**Gereç ve Yöntem:** 2000-2011 yılları arasında akut kolesistit tanısı alan ve PK ile tedavi edilen hastaların kayıtları retrospektif olarak değerlendirildi. ASA skorları, beyaz küre değerleri, safra taşı varlığı, safra kültürleri, ek işlemler, elektif cerrahi, işleme bağlı komplikasyonlar ve mortalite değerlendirildi.**Bulgular:** Yaşları 31 ile 100 arası 127 hastaya (72 erkek, 55 kadın) PK kateteri ile tedavi yapıldı. İşlemin teknik başarısı %100, klinik başarısı % 86 bulundu. İşleme bağlı mortalite veya erken major komplikasyon izlenmedi. Minör komplikasyon oranı %7 (9/127), geç major komplikasyon oranı %3 (4/127) olup 30 günde hastanede mortalite oranı %8 (10/127) bulundu. Altı hasta elektif kolesistektomi sonrası, 4 hasta da PK kateteri takılı durumda öldü. PK ile akalkülöz kolesistitli hastaların %74'ünde (17/23) tedavi sağlandı ve cerrahi yapılmadı. Akut taşlı kolesistitli hastaların % 58'inde (31/53) sadece PK ile tedavi yapıldı ve bunların %10'unda (3/31) takipte nüks kolesistit gelişti.**Sonuç:** Akut kolesistit hastalarında PK primer kolesistektomiye tercih edilmelidir. İşlem kolay yapılabilir bir işlem olup yüksek teknik ve klinik başarı ve düşük komplikasyon oranlarına sahiptir. Yüksek cerrahi riski olan hastalarda kesin tedavi sağlayabilen bir seçenek olarak kullanılabilir.**Anahtar kelimeler:** Girişimsel radyoloji, ultrasonografi, akut kolesistit, kolesistostomi.Yazışma Adresi/Address for Correspondence: Dr. Müge Yıldırım, Gaziemir Nevvar Salih İşgören State Hospital, Department of Radiology, İzmir, Turkey. E-mail: umutozyer@gmail.com
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INTRODUCTION

Early cholecystectomy is the historic treatment for patients suffering acute cholecystitis. Issue with the cholecystectomy is its high morbidity up to 41 % and high perioperative mortality up to 46 % in the elderly and in patients with significant comorbidities¹⁻⁴. Furthermore, morbidity and perioperative mortality of early cholecystectomy has shown to be higher than delayed elective surgery even in the low risk surgical group^{1, 5}. Gall bladder drainage with percutaneous catheter placement is preferred over early cholecystectomy in our institution according to current guidelines⁶.

Conventionally, ultrasound guided percutaneous cholecystostomy (PC) is used as a bridge therapy to overcome a critical period until the patient becomes suitable for laparoscopic cholecystectomy⁷. The procedure offers low morbidity and mortality in high risk surgical patients. This study aims to evaluate the technical success, clinical outcomes and complications of PC in patients with acute cholecystitis. Besides its effectiveness in bridging to delayed cholecystectomy, its role as a definitive treatment option is also evaluated.

MATERIALS AND METHODS

Patient selection

The study was conducted in the interventional radiology unit of a university teaching hospital and approved by the institutional review board of the university. The interventional radiology unit had a patient population exceeding 6000 per year and biliary interventions constituted about 10% of the interventions performed. Medical records of acute cholecystitis patients who underwent emergency PC from year 2000 to 2011 were retrospectively examined from the archive database in the interventional radiology unit and the hospital records by the attendant residents. Patient characteristics, co-morbidities, American Society of Anesthesiologists (ASA) scores, leukocyte counts, presence of gall stones, bile cultures, presence of additional interventions, procedure-related complications and mortality were reviewed from the hospital database for data collection. Patients with clinical diagnosis of acute cholecystitis who

underwent PC procedure were evaluated. The treatment of patients with PC was based on attending clinicians' preference. All patients with increased gallbladder wall thickness and/or pericholecystic fluid were included in the study group. Patients without any radiologic sign of acute cholecystitis were excluded owing to the possibility of misdiagnosis, thus misinterpretation in clinical success of PC. Furthermore, all patients with missing information regarding clinical response or follow-up were excluded.

All procedures performed in this study were in accordance with the ethical standards of the institutional research board and with the 1964 Helsinki declaration and its later amendments. The study was approved by the institution's research board (project no: KA11/129). Informed consents regarding procedures and approval to use the data in clinical investigations were obtained from all patients included in the study group. All data were collected by the interventional radiology residents and

Technique

After obtaining informed consents, PC procedures were performed by an interventional radiologist under ultrasound guidance. Transhepatic approach using the Seldinger technique described by Akhan O, et al. was preferred in majority of the cases⁷. Transperitoneal route was used in case of bleeding diathesis. Intravenous midazolam and fentanyl citrate were used for sedation and analgesia in agitated patients. After administration of local anesthetic (2% prilocaine), 8 to 12-French locking pigtail drainage catheters (Flexima APDL, Boston Scientific) were placed in the gallbladder. Clinical success of PC was assessed by the decrease in white blood cell count and resolution of symptoms as described in the clinicians' follow-up⁸. Catheters were followed up on gravity drainage and were not removed for at least 3 weeks for tract maturation to occur. Control cholecystograms were obtained at 3, 7 and 21 days to evaluate the passage through the cystic duct and common bile duct. Catheters were withdrawn in case of symptom recovery and unobstructed passage to the duodenum after 3 weeks. All patients were followed up with the drainage catheter until elective surgery in case of obstructed passage.

Statistical analysis

Measured values were reported as percentages or means.

RESULTS

A total of 127 patients (55 female, 72 male) with a mean age of 72 years (range 31 to 100 years) were retrospectively reviewed. One hundred four patients had gallstones and 23 had acalculous cholecystitis. Accompanying co-morbidities were as follows; hypertension in 84, diabetes mellitus in 34, chronic obstructive pulmonary disease in 19, congestive heart failure in 15, chronic renal failure in 15, coronary artery disease in 14, advanced stage malignancy in 13 and history of stroke in 12 patients. Seven of the patients had accompanying pancreatitis and one had sepsis at the time of admission. Surgical risk classification of the patients were as follows; ASA II: 57, ASA III: 44 and ASA IV: 26 patients. All ASA II patients subject to percutaneous cholecystostomy were elderly patients (age range, 74 to 100 years) with mild co-morbidities.

Mean drainage duration was 32 days (range, 21 to 60 days). Follow-up with cholecystography was performed in 105 of the patients; bile flow to the duodenum was present in 81 patients and obstruction was diagnosed in 24 of the patients. Ten of the 81 patients with unobstructed bile flow to the duodenum (12%) underwent elective cholecystectomy. Among the patients with unobstructed bile flow that were not operated (n=71), three patients (4%) required repeat cholecystostomy due to recurrent acute cholecystitis 4 to 12 months after removal of the catheter. Twelve of the patients with obstruction (50%) underwent elective cholecystectomy and one died within the first week due to a reason of present malignancy (4%). Three patients (13%) with biliary obstruction revealed bile flow to the duodenum during follow-up thus were not operated and had no symptomatic recurrence after their catheters were withdrawn. Eight of the patients with obstruction who were discharged from the hospital after symptoms subside were lost to follow-up (33%).

Bile cultures were obtained from all cases and 67 of them (53%) were positive. The most common pathogen was *Escherichia coli* (n=32) followed by *Enterococcus* species (n=18), *Klebsiella* species

(n=10), *Pseudomonas aeruginosa* (n=5), and *Acinetobacter baumannii* (n=2).

PC was performed successfully in all patients. No early major complications such as major bleeding, bowel perforation and procedure-related deaths occurred. Late major complication rate was 3% (n=4). One patient suffered sepsis leading to death at the twenty second day of cholecystostomy placement, one patient suffered a cutaneous fistula and two patients suffered choledocho-duodenal fistulas. Patients with choledocho-duodenal fistula were successfully treated with percutaneous biliary drainage followed by plastic biliary stent placement. Minor complication rate was 7% and they were bile leaks after catheter dislodgement (n=4) or leakage adjacent the catheters (n=5). These cases were treated with replacement of the catheter with a larger size.

Clinical success of PC was assessed by white blood cell count and resolution of symptoms. Ninety-three of the 127 patients (73%) had leukocytosis at the time of admission (mean: 14812/ μ l, range:7200-22200/ μ l) and 86% of the patients (n=80) showed normal leukocyte counts (mean: 8233, range: 4720 to 13400/ μ l) within 72 hours after the procedures. Leukocytosis persisted in six patients with accompanying abscesses, four patients with acute pancreatitis and one patient with pancreatic malignancy. Mean hospitalization time was 8.3 days (range 2 to 58 days). Thirty day in-hospital mortality rate was 8% (n=10). There were no technique related deaths.

Fifty-seven patients were operated following percutaneous cholecystostomy. Mean time interval from the PC to the surgery was 89 days (range 5 days to 24 months). Six of 21 patients (29%) operated within 1 month died after the operation. Seventy patients were not operated. Four of these patients (6%) died due to sepsis (n=2), multi organ failure due to present malignancy (n=1) and cardiac failure (n=1) within one month after cholecystostomy placement. Additional percutaneous interventions had to be performed in 27 of the patients. Accompanying seven bilomas and two abscesses due to bile leak and seven fluid collections due to concurrent pancreatitis were treated with percutaneous catheter placement. Four patients with dislodged catheters underwent re-catheterization because symptoms did not resolve completely. Three patients with acute calculous cholecystitis experienced recurrent acute

cholecystitis and were re-catheterized four to twelve months after catheter withdrawal. Three patients with fistula formation were treated with biliary drainage followed by biliary stent placement. Pericholecystic fluid collection in one patient with gall stone ileus was drained with catheter placement.

DISCUSSION

PC has been used as an effective procedure for emergency decompression of the infected gall bladder in high surgical risk patients since its first therapeutic use in 1980³. It is found to be a safe procedure with clinical improvement rates ranging from 56 to 100%^{7,8}. We reported our ten year experience in this article. All the procedures were technically successful, revealing a clinical improvement rate of 86% with no technique related deaths or major complications which is consistent with the literature^{3,7,9-11}. Transhepatic PC was defined with risks of major hemorrhage, hemobiliary fistula formation or pneumothorax in previous studies^{3,7}. Nevertheless, transhepatic route should be the primary option and transperitoneal route should be reserved for cases with severe liver disease and coagulopathy given that no such technique related complications occurred in our study of 127 cases⁷.

Early complications of percutaneous cholecystectomy are defined as bleeding, vagal reactions, sepsis, biliary peritonitis, pneumothorax and bowel perforation³. No early complications occurred in this study. We had two patients with sepsis; one of them had sepsis at admission and the other developed sepsis 22 days after catheter placement thus not regarded as an early complication of the procedure. Late complications were catheter dislodgement in four patients who were re-catheterized with uneventful follow-ups after then. Three patients with acute calculous cholecystitis experienced recurrent acute cholecystitis and were re-catheterized after 4 to 12 months after catheter withdrawal.

Major complication rates of percutaneous cholecystostomy ranges between 3 to 8% and minor complication rates between 4 to 13% in various studies^{3,12,13}. Our study revealed 4% major and 7% minor complication rates, comparable to previous studies. Two of the major and all minor complications were treated successfully with percutaneous interventions. Only one patient with

the cutaneous fistula and one patient with sepsis were not treated with percutaneous procedures.

Historical treatment for acute acalculous cholecystitis has been cholecystectomy. Recently, some studies support PC to be the definitive treatment for acute acalculous cholecystitis. The number of patients range from 7 to 28 and recurrence rates range from 0 to 7% in these studies¹³⁻¹⁶. In our study, 17 of 23 patients (74%) with acalculous cholecystitis were treated successfully with percutaneous cholecystostomy alone and none of them suffered recurrent cholecystitis. However, previous studies and our study consisted of limited cases. Therefore, more studies are necessary to conclude that PC should be the treatment of choice in acalculous cholecystitis patients.

Fifty-three of 104 patients (51%) with gallstones and unobstructed bile flow to duodenum did not undergo elective cholecystectomy. Thirty-one of these 53 patients (58%) did not suffer any complications or recurrent cholecystitis. One-month mortality rate of acute calculous cholecystitis patients with interval cholecystectomy (12%) was more than patients who were not operated (6%). Considering that only 6% of the patients (3/53) who were not operated had recurrent cholecystitis, and mortality rate of 51 patients with elective cholecystectomy is 12% (n=6), PC may be sufficient to treat patients in cases elective surgery bear high risk. However, randomized data are necessary to obtain more objective results.

Limitations of this study substantially relate to its retrospective nature leading to incomplete data acquisition, especially regarding signs and symptoms of acute cholecystitis before and after the procedures. The population in the study was composed of different age groups and ASA risk scores. This fact is considered a limitation revealing higher clinical success rates than it should be, however it is also important because the results correlate well with the general population.

To conclude; PC through transhepatic approach can be preferred to primary cholecystectomy owing to high technical success, high clinical response and low complication rates. Sole use of PC to treat acute cholecystitis is promising however more studies with randomized data are still necessary.

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