Percutaneous cholecystostomy treatment for acute cholecystitis in high risk patients

Ahmed Farouk Abdulaal *, Shawki Kadri Sharouda, Hanan Abdulaziz Mahdy

Ain Shams University, Egypt

Received 23 April 2014; accepted 7 July 2014
Available online 11 August 2014

Abstract  Aim: To assess the efficacy and safety of percutaneous cholecystostomy in treatment of acute cholecystitis in high risk patients. 
Patients and methods: This retrospective study included 21 patients with clinical and sonographic signs of acute cholecystitis and comorbid disease who underwent percutaneous cholecystostomy for management of acute cholecystitis from June 2009 to January 2014. 
Results: Percutaneous cholecystostomy was technically successful in 19 patients and showed positive clinical response at 72 h in 17 patients. Bile leakage due to catheter dislodgement in one patient was managed by change of catheter and re-insertion. The second patient had partial rupture of gall bladder, five patients underwent cholecystectomy. After cholecystostomy there were reductions of leukocytosis and C – reactive protein.
Conclusion: As an alternative to surgery, percutaneous cholecystostomy is a safe and effective method of treatment in critically ill patients with acute cholecystitis.

1. Introduction

Acute cholecystitis is a frequent cause of general surgical admission with a mortality that is related to the age of the patient (1). Laparoscopic cholecystectomy is now considered the gold standard for surgical management of acute cholecystitis (2), yet management of critically ill and complex patients with acute cholecystitis remains controversial (3). Surgical options are often unfavorable in patients who are very unwell or have numerous medical co-morbidities in which the mortality rates are significant (4), morbidity up to 41% (5) and mortality up to 45% (6) (see Figs. 1–4).

An alternative approach to surgical removal of the gall-bladder is decompression and systemic antibiotic therapy (4). Surgical cholecystostomy was first described in 1867 (7), but the first percutaneous cholecystostomy for acute cholecystitis was not performed until 1980 under ultrasound guidance (8). Percutaneous cholecystostomy is a therapeutic procedure for decompressing the gallbladder for managing cholecystitis either definitively or as a temporizing measure before cholecystectomy (9).
The purpose of the study is to assess the efficacy and safety of percutaneous cholecystostomy in treatment of acute cholecystitis in high risk patients.

2. Patients and methods

Between June 2009 and January 2014 percutaneous cholecystostomy was performed on 21 patients with acute cholecystitis and comorbid disease in a specialized Hospital in Jeddah, Saudi Arabia.

Age of patients ranges from 38 to 85 years, median age is 60 years, 15 patients are male and 6 patients are female.

All patients underwent full history taking, physical examination, laboratory and imaging studies in order to record the data about comorbid disease, etiology of cholecystitis and diagnostic criteria for acute cholecystitis and exclusion criteria for percutaneous cholecystostomy.

Ultrasound was done for all patients and Computed tomography (CT) for eight patients to exclude other pathology.

The diagnostic criteria of acute cholecystitis included clinical signs and symptoms (right upper quadrant pain or tenderness) leukocytosis or positive C-reactive protein (CRP) value > 5 mg/L and at least one of the ultrasonographic criteria including gall bladder stones (for calcular cholecystitis) ultrasonographic Murphy sign, gall bladder wall thickening > 3 mm, pericholecystic fluid collection and gall bladder distension (10).

Absolute contraindication includes interposed bowel preventing access to the gall bladder and untreated or severe bleeding diathesis.

Relative contraindication includes decompressed gall bladder due to perforation, gall bladder completely packed with calculi such that a drain cannot be accommodated within it and gall bladder cancer due to risk of seeding along the track (11).

2.1. Technique

Patients were admitted to the hospital, written informed consent was obtained after fasting for 6–8 h. IV antibiotic (broad spectrum) was started immediately after diagnosis and subsequent antibiotic therapy was managed according to the culture result of bile.

If coagulopathy is present correction of the condition can be achieved by transfusion of fresh frozen plasma or platelets or both.

All procedures were performed in the interventional suite using imaging guidance of ultrasound and fluoroscopy. We used local anesthesia in most of the cases with or without light sedation and general anesthesia in two cases.

2.2. Procedure

The gallbladder was identified with sonogram then puncture site was chosen.

Under aseptic condition ultrasound guided transhepatic approach through the right lobe was used to access the gallbladder in majority of patients while in two patients we used ultrasound guided transperitoneal approach.

For local anesthesia, lidocaine 1% was administered in the subcutaneous tissue along the liver capsule. Two puncture techniques were used for percutaneous cholecystostomy either seldinger technique or trocar needle catheter. The seldinger technique was the widely used method; it comprised initial puncture and confirmation of the appropriate position with a relatively small needle. A wire was then passed to maintain this position guided, over the guide wire a larger catheter than the original needle could be passed with track dilation. An 18-gauge echogenic tip needle (secalon) was used to puncture then a guide wire (amplatz 0.35) was inserted into the gallbladder lumen. The route was then dilated using a 6F, 7F or 8F dilator. Finally a 7F or 8F pigtail catheter was inserted.

The Trocar technique used a simultaneous puncture and placement of a catheter mounted on a sharp stylet with free hand technique, sizes of pigtail catheter range from 6F to 8F.

The drainage catheter localization was controlled by fluoroscopy through injecting a small amount of contrast. Bile samples were obtained for micro biological and cytological analyses and culture sensitivity, the drainage catheter was fixed to the skin by sutures or adhesive dressing, catheter flushing with 0.9% saline was performed twice daily to maintain catheter patency.

2.3. Post procedure care

Patients should have bed rest, regular observation for vital sign monitoring and adequate analgesia for symptoms like local pain or shoulder discomfort. In patients who had a difficult procedure and persistent right hypochondrial or chest pain, a chest radiograph was obtained to exclude pneumothorax.

On the second day of percutaneous cholecystostomy ultrasound examination was performed to check the site of the catheter, look for bile or blood leakage and size of the gallbladder. Laboratory data such as leucocyte count and C-reactive protein were evaluated and repeated after 3 days.

The patient was discharged with the drain in place. The drain was left in situ during a period of 2 to 3 weeks after which contrast imaging of the drain will be performed to assess whether the drain is still located in the gallbladder and whether there is a patent cystic duct.

A number of factors will affect the timing of catheter removal such as clinical response and purpose of percutaneous cholecystostomy (bridge to surgery or definitive).

Generally, percutaneous cholecystostomy drains are removed, following a successful trial of drain clamping and if percutaneous cholecystostomy is to be a definitive treatment, the catheter should be replaced every 3 months.

Five patients underwent cholecystectomy, two within 5 days, one after 7 days, one after 12 days and last one after 30 days of cholecystostomy, two laparoscopically and the other three started laparoscopically then converted to open due to adhesion.

3. Result

Percutaneous cholecystostomy was done for 21 patients. The median age of treated patients is 60 years (range 38–85 years) and 15 patients were male (71.4%).

6 patients had acalculous and 15 have calculous cholecystitis.

Comorbid diseases include congestive heart failure and severe ischemic heart disease in 5 patients (23.8%), chronic
obstructive respiratory failure in 2 patients (9.5%), renal failure in 3 patients (14.2%), liver cirrhosis in 3 patients (14.2%), hypertension in 2 patients (9.5%) and diabetes mellitus in 6 patients (28.5%).

The procedure was done under local anesthesia for 19 patients (90.5%) and under general anesthesia in 2 patients (9.5%). We used transhepatic approach for 19 patients (90.5%) and transperitoneal approach for 2 patients (9.5%).

Percutaneous cholecystostomy was technically successful in 19 patients (90.4%) and showed positive clinical response at 72 h in 17 patients (80.9%).

One patient experienced bile leakage on the second day after the procedure due to catheter dislodgement for which change of catheter and reinsertion were done and this patient was considered technically unsuccessful. Five patients underwent cholecystectomy, 4 of them showed no positive clinical response within 72 h, 2 underwent the operation within 5 days of the cholecystostomy due to partial rupture of gall bladder and the other one developed severe unrelied right hypochondrial pain. The third and fourth patients underwent cholecystectomy after 7 days and 12 days of cholecystostomy. The last patient underwent elective cholecystectomy after 30 days of cholecystostomy due to recurrence of sign and symptoms.

One patient experienced mild bleeding at perihepatic area, no intervention done.

Two patients developed right sided pleural effusion and one of them needed aspiration which was done. No pneumothorax developed, no procedure related death occurred.

Fig. 1  A 61 year old man in ICU with acute calcular cholecystitis referred for percutaneous cholecystostomy drainage. (A) Sonogram shows GB with multiple stones inside. (B) Ultrasound guided drainage after deployment of the catheter and pig tail coiled in the GB. (C) Cholangiogram obtained via the cholecystostomy catheter shows filling defect of the stones inside GB and no contrast leakage.
Bile culture was negative in 10 patients, *Escherichia coli* was only bacteria in 7 patients. *Enterococcus fecalis, Enterobacter cloacae, Streptococcus gallolyticus* and *Proteus mirabilis* were identified in each of the remaining 4 patients.

The mean white cell count and mean CRP at admission were significantly decreased in the next 72 h in the 17 patients which showed a positive clinical response.

Fig. 2  A 62 year old man in ICU with distended GB referred for percutaneous cholecystostomy drainage. (A) Sonogram shows distended gall bladder with thickened wall and sludge. (B) Axial CT abdomen with contrast revealed distended GB, thickened wall and sludge inside. (C) Ultrasound guided drainage, trocar catheter in the GB. (D) Ultrasound: deployment of the catheter and pig tail coiled in the GB. (E & F) Cholangiogram obtained via the cholecystostomy catheter to ensure its position and no leakage. CBD stent was seen.

4. Discussion

The treatment of acute cholecystitis in high risk patients is a much debated subject in the surgical community (5).

Open cholecystectomy, first developed by the German Surgeon Carl JA Langenbuch was for many years the primary treatment for symptomatic acute cholecystitis (12).
Laparoscopic cholecystectomy is now the reference standard, although generally regarded as a safe operation with a mortality rate of around 2% (13).

The use of cholecystostomy tube was first described as an option in patients who were critically ill with acute cholecystitis, it is either placed percutaneously or surgically. Placement of surgically placed cholecystostomy tube laparoscopically offers many advantages for the surgeon who is considering an attempt at laparoscopic cholecystectomy, first but knows that a surgically placed cholecystostomy tube can be performed if the inflammation of the gall bladder is too severe (14).

Percutaneous cholecystostomy is defined as an alternative treatment method in patients with acute cholecystitis who were at high risk during surgery due to comorbid disease; it represents a minimally invasive procedure for providing gallbladder decompression (15).

Gall bladder decompression for the management of cholecystitis can be performed as a definitive therapy in patients at high risk with medical comorbidities or as temporizing with measure augmenting medical treatment and preceding a subsequent non elective cholecystectomy. The decision of whether to proceed with cholecystectomy (in surgical candidate) or consider percutaneous cholecystostomy as a definitive measure (in a nonsurgical candidate) is usually multi-disciplinary (i.e. surgical, anesthesiology and radiology) and depends on patients’ response to therapy (9).

Fig. 3 A 42 year old man in ICU with distended GB referred for percutaneous cholecystostomy drainage. (A) Axial CT abdomen with contrast revealed distended and thickened wall GB. (B) Cholangiogram obtained via the cholecystostomy catheter after insertion by 3 weeks revealed a decrease in GB distension, patent cystic and CBD.

Fig. 4 A 67 year old female in ICU with acute cholecystitis referred for percutaneous cholecystostomy drainage. (A) Cholangiogram obtained via an 18-gauge needle (Secalon) before insertion of drainage pigtail catheter revealed distended GB, stones inside and thickened wall. (B) Cholangiogram obtained via the drainage catheter after insertion by 3 weeks revealed patent cystic and CBD.
In our study prior to the procedure written informed consent was gained, broad spectrum antibiotics were prescribed with a good gram negative cover such as *E. coli* in the most commonly cultured pathogen. Significant abnormal clotting should be corrected prior to the procedure and in our experience review of prior imaging studies are essential to planning the procedure by helping to determine the access route; transhepatic or transperitoneal and can highlight difficult or variant anatomy.

We use ultrasound and fluoroscopy as image guidance for our patients.

Ultrasound probes used are convex and sector 5–8 MHz probes, a sector probe is preferable for an intercostal approach. Catheter position is confirmed using a small volume of hand injected iodinated contrast medium under fluoroscopic guidance. A minimal volume of contrast medium should be injected to minimize distal spread of pathogens and resultant exacerbation of sepsis.

Ideally the puncture site should be subcostal but if an intercostal approach is required, care should be taken to avoid pleural space and to avoid the intercostal neurovascular bundle passing inferior to the rib.

In our study we use and prefer transhepatic approach, pass the catheter via the bare area of the liver, which is extra peritoneal in order to access the gallbladder. Advantages of this approach are it reduces the risk of bile leak, provides greater catheter stability and quicker tract maturation also, it is the safest method in cases with large ascites and bowel inter position between the liver and gallbladder (15).

But there is a higher rate of hepatic bleeding, hemobiliary fistula and pneumothorax reported from this approach in many other series (16) but in our study one patient developed mild perhepatic bleeding which resolved spontaneously within 5 days.

The transperitoneal route is preferable in patients with liver disease or coagulopathy.

In our experience the trocar puncture technique is preferable as it reduces the number of steps making it faster and simpler to perform but bleeding risk was high and we found one patient with bleeding at perhepatic area which resolved spontaneously.

Advantage of Seldinger technique lies in the relatively small defect in any structure by the initial needle thereby reducing the damage to any puncture organ.

In all cases we use locking pigtail catheter drain to ensure adequate fixation and drainage catheter was fixed to the skin with suture or adhesive dressing.

In our study infection is not present in all patients. Bile cultures were positive in only 11 (52.3%) of our patients and it is similar to the frequency mentioned by Joseph et al. 52% (17) and close to the frequency of 49% described by Chopra et al. (18).

Percutaneous cholecystostomy was considered technically successful when the pigtail catheter loop was visualized sonographically and fluoroscopically in the gallbladder lumen and the gallbladder content would be aspirated freely through percutaneous cholecystostomy catheter.

Positive clinical response was defined as normalization of at least two of the three clinical parameters of acute cholecystitis (abdominal pain, fever and leukocytosis) within 72 h.

In our study technical success happened in 19 patients (90.4%) and positive clinical response was achieved in 17 patients (80.9%). Five patients underwent cholecystectomy, two of them within 5 days of the procedure due to no positive clinical response within 72 h and complication occurred which necessitates emergency cholecystectomy. Other two underwent cholecystectomy after 7 days and 12 days due to no positive clinical response. The last one underwent cholecystectomy after 30 days due to recurrence of signs and symptoms of cholecystitis.

Major complications in two patients (9.5%) are partial rupture of gallbladder and severe uncontrolled pain for which emergency laparoscopic cholecystectomy was done.

Chopra et al. (18) reported that percutaneous cholecystostomy was technically successful in 97% and clinical improvement was achieved in 90% and complications occurred in 14%.

Nasim et al. (1) reported 92% resolution of patient symptoms of acute cholecystitis after percutaneous cholecystostomy by 48 h and reported 31% post procedural complications including hemorrhage, pneumonia, hypotension and vasovagal reaction.

Joseph et al. (17) reported 72 patients (68%) showed improvement clinically whereas 34 (32%) showed no improvement or a clinically worsened condition after cholecystostomy.

5. Conclusion

Percutaneous cholecystostomy is a fast, easy, effective and technically achievable method for the treatment of cholecystitis with low complication rate even in unwell patients such as elderly and critically ill.

Conflict of interest

We have no conflict of interest to declare.

References


Percutaneous cholecystostomy treatment for acute