Percutaneous cholecystostomy as an alternative to cholecystectomy in high risk patients with biliary sepsis: a district general hospital experience

W Al-Jundi, T Cannon, R Antakia, U Anoop, R Balamurugan, N Everitt, K Ravi

Chesterfield Royal Hospital NHS Foundation Trust, UK

ABSTRACT

INTRODUCTION Cholecystectomy is the standard treatment for patients with acute cholecystitis. However, percutaneous cholecystostomy (PC) is an alternative for patients at high risk for surgery. We present our five-year clinical experience with the aim of evaluating the efficacy of PC in high risk patients.

METHODS A retrospective review was performed on 30 consecutive patients who underwent PC at our institution. The indications for cholecystostomy, route of insertion, technical success, clinical improvement, length of hospitalisation, in-hospital or 30-day mortality, complications, subsequent admissions and performance of interval cholecystectomy were recorded. The median follow-up period was 25 months (range: 1–52 months).

RESULTS Thirty-two PCs were performed in thirty patients (mean age: 76.1 years; range: 52–90 years). The indications for PC were acute calculous cholecystitis (29/32), acalculous cholecystitis (1/32) and emphysematous cholecystitis (2/32). The route of insertion was transperitoneal for 22/32 PCs (68.8%) and transhepatic for 10/32 (31.2%). The procedure was technically successful in all patients although 2/22 transperitoneal drains (9.1%) were dislodged subsequently. Twenty-seven PCs (84.4%) resulted in clinical improvement within five days. The in-hospital or 30-day mortality rate was 16.7% (5/30). Eleven patients (36.7%) had a subsequent cholecystectomy: 6 were laparoscopic and 5 converted to open procedures at a median interval of 58 days (range: 1–124 days).

CONCLUSIONS PCs are straightforward with few complications. Most patients improve clinically and the procedure can therefore be used as a definitive treatment in unfit patients or as a bridge to surgery in those who might subsequently prove fit for a definitive operation.

KEYWORDS

Percutaneous cholecystostomy – Biliary drainage – Acute cholecystitis

Accepted 5 November 2011

CORRESPONDENCE TO

Wissam Al-Jundi, 44 Admiral Biggs Drive, Treeton, Rotherham S60 5TS, UK
T: +44 (0)773 808 0977; E: wajundi@hotmail.com

The usual method for treating acute cholecystitis is cholecystectomy. Although the mortality rate for this operation is less than 1%, when performed as an emergency procedure in elderly patients with co-morbidities, the mortality can be as high as 30%.^{1,2}

Percutaneous cholecystostomy (PC) using ultrasonography guidance was first described by Radder in 1980 as a method of draining a gallbladder empyema.³ PC is minimally invasive and avoids general anaesthesia. It can be used as an alternative for the management of acute cholecystitis either as a bridge to surgery or as a definitive management for unfit patients and those who decline a cholecystectomy.

Our study was carried out to evaluate the efficacy of percutaneous drainage in managing acute gallbladder disease in high risk patients in routine practice at a district general hospital. We also examined the outcomes in those who underwent a delayed cholecystectomy and in patients who had no further interventions following PC.

Methods

Between November 2006 and February 2011, 32 PCs were performed on 30 patients in our unit in a large district general hospital. The medical records of these patients were reviewed retrospectively and data were retrieved on age, sex, indications for cholecystostomy, route of insertion, technical success, clinical improvement, length of hospitalisation, in-hospital or 30-day mortality, complications, bacteriology of aspirated bile, subsequent admissions and performance of interval cholecystectomy.

The diagnosis of acute cholecystitis was based on the clinical symptoms (right upper quadrant or epigastric pain, or tenderness), leucocytosis or raised C-reactive protein (CRP) test results and at least one of the following sonographic findings: distended gallbladder, gallbladder wall thickening >3mm or debris in the gallbladder. All patients were admitted as an emergency and immediately started on fluid resuscitation, analgesics and broad-spectrum in-

travenous antibiotics of co-amoxiclav or second generation cephalosporin in combination with metronidazole. Patients who were allergic to penicillin received ciprofloxacin and metronidazole. The decision to perform PC followed failure of these conservative measures and deteriorating clinical signs within the first 36–48 hours in high risk patients. The median follow-up period was 25 months (range: 1–52 months).

All cholecystostomies were performed under ultrasonography guidance. Puncture of the gallbladder was either through the transhepatic route or by the transperitoneal approach (direct gallbladder puncture, without passing through the liver). Coagulopathy was corrected before the procedures, maintaining an international normalised ratio of <1.5 and a platelet count above $50 \times 10^9/L$. Drainage was performed using a one-step diamond shape trocar head needle.

Results

Thirty-two PCs were performed in 30 patients (17 men, 13 women; mean age: 76.1 years; range: 52–90 years). The indications for PC were acute calculous cholecystitis ($n=29$, 90.6%), acalculous cholecystitis ($n=1$, 3.1%) and emphysematous cholecystitis ($n=2$, 6.3%). At the time of performing the PC, 5 patients were admitted to the intensive care unit, 3 patients to the high dependency unit and 22 patients to a general surgical or medical ward. All patients had co-morbid conditions that were deemed an unacceptably high risk for cholecystectomy (Table 1).

Table 1 Co-morbidities precluding cholecystectomy

Condition	Patients
Severe sepsis	10 (33.3%)
Advanced cardiovascular disease	10 (33.3%)
Advanced multisystem disease	6 (20.0%)
Advanced respiratory disease	3 (10.0%)
Uncontrolled diabetes	1 (3.3%)
Total	30 (100%)

The route of insertion was transperitoneal in 22/32 PCs (68.8%) and transhepatic in 10/32 (31.2%). The procedure was technically successful in all patients although 2/22 transperitoneal tubes (9.1%) were dislodged subsequently, albeit without complications. Clinical improvement (defined as pain relief, decrease in temperature to below 37.5°C and a reduction in white blood cell count or CRP levels of 25% or more within 5 days after PC) was achieved in 27 PCs (84.4%). In two cases, no improvement in clinical parameters led to a subsequent cholecystectomy, when empyema of the gallbladder was found. Three patients had a delayed response following their PC. In one, the indication was acalculous cholecystitis.

The mean hospitalisation time for the 30 patients was 21.7 days (range: 1–107 days). The in-hospital or 30-day mortality rate was 5/30 (16.7%): 3 deaths (10%) were directly related to gallbladder sepsis and 2 deaths (6.7%) were due to co-morbid disease. Cultures of the bile aspirated

from the patients' gallbladders were positive in 19/32 (59.3%), negative in 7/32 (21.9%) and not recorded in 6/32 cases (18.8%). The positive cultures revealed *E coli* in ten cases (52.6%), *E coli* and *Enterococcus* species in two cases (10.5%), *Enterococcus* in one case (5.3%), *Pseudomonas* in one case, (5.3%), *Bacteriodes* in one case (5.3%) and multiple isolates in three cases (15.8%) with cultures of *Proteus* and *Streptococcus milleri* also encountered.

PC was considered a definitive treatment in 19 patients (63.3%) while 11 patients (36.7%) had a subsequent cholecystectomy: 6 were laparoscopic and 5 converted to open procedures at a median interval of 58 days (range: 1–124 days) (Table 2). The overall conversion rate from laparoscopic to open cholecystectomy was therefore 45.5%.

Table 2 Long-term management following percutaneous cholecystostomy (PC)

Management	Patients
PC as definitive management	19 (63.3%)
PC as bridge to cholecystectomy	
Laparoscopic	6 (20.0%)
Laparoscopic converted to open	5 (16.7%)
Total	30 (100%)

Discussion

Laparoscopic cholecystectomy is considered the gold standard treatment for patients with symptomatic gallbladder disease. Nevertheless, in an aging subpopulation with medical co-morbidities, immediate definitive surgery may be hazardous. PC offers an alternative method of management for patients deemed too high risk to undergo emergency laparoscopic cholecystectomy.

Radder first described ultrasonography guided PC in 1980 for the management of gallbladder empyema.⁵ This option of management has since been confirmed as safe and successful in a number of publications.^{4–6}

Successful placement of the cholecystostomy drain occurred in 100% of our patients. This is comparable to success rates seen in previous published studies.^{4–8} Twenty-two tubes (68.8%) were placed by a transperitoneal route, the remainder being placed transhepatically. No immediate complications of drain placement were seen in this study.

We did not observe any bleeding during insertion although this complication has been documented previously in association with transhepatic insertion.^{6,9} It has also been suggested that there is an increased risk of pneumothorax and empyema when the transhepatic insertion route is used,⁴ yet this complication was not seen.

Prompt clinical improvement was observed after 27 PCs (84.4%). In two cases, lack of improvement led to salvage cholecystectomy, at which empyema of the gallbladder was found. In the remaining three patients, a delayed response was seen. These rates of clinical improvement are similar to those documented in previous studies.^{4–7} A delayed clinical

response to PC was observed in the single patient who presented with acalculous cholecystitis. Patients who present with acalculous cholecystitis frequently do so against a background of an overwhelming systematic inflammatory response secondary to other pathology,¹⁰ whereas in patients with cholecystitis secondary to gallbladder stones, the primary pathology is in the gallbladder itself. It is perhaps hardly surprising that systemic features of sepsis settle more promptly in the latter group. Nonetheless, PC is important in reducing the risk of gallbladder perforation in all cases.

Five patients (16.67%) in our series died within thirty days or while hospital inpatients but only three deaths (10%) were directly related to gallbladder sepsis while two deaths (6.7%) were due to co-morbid disease. Although it is difficult to compare mortality rates across studies, our inpatient mortality rate for this study is comparable to previously reported 30-day mortality rates of 6–20%.^{4–6,8,11}

Subsequent to the PC, 11 of the 30 patients underwent a cholecystectomy. Six had a laparoscopic cholecystectomy while five had laparoscopic surgery converted to an open procedure. This demonstrates that with optimisation, patients who are deemed surgically unfit at acute presentation can undergo an elective procedure later. Our high conversion rate (45.5%) was due to the significant fibrosis encountered in this group of patients. To our knowledge, there are no studies that have examined the conversion rate of laparoscopic cholecystectomies to open surgery following a PC. Conversion rates are lower when cholecystectomy is performed in the acute phase, before fibrosis develops, but as with the patients included in this study, not all are fit for immediate surgery.

There was a lower conversion rate when an upper gastrointestinal surgeon performed the procedure. However, statistical comparison is limited by the small number of procedures performed. Previous studies have shown a conversion rate as low as 12% when laparoscopic cholecystectomy is performed in the acute stage, provided the surgery is led by an experienced upper gastrointestinal surgeon.¹² We suggest that patients who undergo a PC as a bridge to surgery should be referred to an experienced surgeon with a large caseload of laparoscopic work.

The disadvantage of a PC is that although the actual inflammatory episode will probably settle, the causative gallbladder stones remain and the patient is at risk of future attacks of cholecystitis. For this reason, elective cholecys-

tectomy is recommended whenever possible. It is worthy of note that two of the most unfit patients in this series suffered a second attack of cholecystitis, necessitating a further PC. Although these patients would never be fit for surgery, the repeated PCs proved efficacious and lifesaving procedures.

Conclusions

The placement of a PC tube is an effective and simple procedure that can be used to treat severe acute cholecystitis in patients unfit for immediate surgery. Following resolution of symptoms and optimisation of patients' medical conditions, laparoscopic cholecystectomy should be considered the treatment of choice. When further attacks of cholecystitis occur in unfit patients, the PC can be repeated.

References

1. Edlund G, Ljungdahl M. Acute cholecystitis in the elderly. *Am J Surg* 1990; **159**: 414–416.
2. Houghten PW, Jenkinson LR, Donaldson LA. Cholecystectomy in the elderly: a prospective study. *Br J Surg* 1985; **72**: 220–222.
3. Radder RW. Ultrasonically guided percutaneous catheter drainage for gallbladder empyema. *Diagn Imaging* 1980; **49**: 330–333.
4. Chok KS, Chu FS, Cheung TT *et al*. Results of percutaneous transhepatic cholecystostomy for high surgical risk patients with acute cholecystitis. *ANZ J Surg* 2010; **80**: 280–283.
5. Teoh WM, Cade RJ, Banting SW *et al*. Percutaneous cholecystostomy in the management of acute cholecystitis. *ANZ J Surg* 2005; **75**: 396–398.
6. Byrne MF, Suhocki P, Mitchell RM *et al*. Percutaneous cholecystostomy in patients with acute cholecystitis: experience of 45 patients at a US referral center. *J Am Coll Surg* 2003; **197**: 206–211.
7. Chopra S, Dodd GD, Mumbower AL *et al*. Treatment of acute cholecystitis in non-critically ill patients at high surgical risk: comparison of clinical outcomes after gallbladder aspiration and after percutaneous cholecystostomy. *Am J Roentgenol* 2001; **176**: 1,025–1,031.
8. Hadas-Halpern I, Patlas M, Knizhnik M *et al*. Percutaneous cholecystostomy in the management of acute cholecystitis. *Isr Med Assoc J* 2003; **5**: 170–171.
9. Yang KW, Luk WH, Cho DH *et al*. A comparison of direct gallbladder puncture with the transhepatic puncture technique in ultrasound-guided cholecystostomy for high surgical risk patients with acute calculous cholecystitis. *J HK Coll Radiol* 2005; **8**: 222–225.
10. Leveau P, Andersson E, Carlgren I *et al*. Percutaneous cholecystostomy: a bridge to surgery of definite management of acute cholecystitis in high-risk patients? *Scand J Gastroenterol* 2008; **43**: 593–596.
11. Silberfein EJ, Zhou W, Koungias P *et al*. Percutaneous cholecystostomy for acute cholecystitis in high-risk patients: experience of a surgeon-initiated interventional program. *Am J Surg* 2007; **194**: 672–677.
12. Knight JS, Mercer SJ, Somers SS *et al*. Timing of urgent laparoscopic cholecystectomy does not influence conversion rate. *Br J Surg* 2004; **91**: 601–604.