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Percutaneous cholecystostomy in the management of high-risk patients presenting with acute cholecystitis: Timing and outcome at a single institution

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ABSTRACT

Background: Cholecystectomy is the standard of care in acute cholecystitis (AC). Percutaneous cholecystostomy (PC) is an effective alternative for high-risk surgical cases.
Methods: A retrospective analysis is presented of AC patients treated with PC drainage at a single tertiary institution over a 21 month period, assessing outcome and complications.
Results: Of 119 patients, 103 had clinical improvement after PC insertion. There were 7 peri-procedural deaths (5.9%), all in elderly high-risk cases. Overall, 56/103 cases (54%) were definitively managed with PC drainage with 41 patients (40%) undergoing an elective cholecystectomy (75% performed laparoscopically). The timing of PC insertion did not affect AC resolution or drain-related complications, although more patients underwent an elective cholecystectomy if PC placement was delayed (>24 h after admission).
Conclusions: In AC, drainage by a PC catheter is a safe and effective procedure. It may be used either as a bridge to elective cholecystectomy or in selected cases as definitive therapy.

1. Introduction

As the patient population ages, there is a commensurate increase in the number of cases in surgical departments which require treatment for acute cholecystitis (AC). Although laparoscopic cholecystectomy (LC) remains the treatment of choice during the acute phase of illness,[1,2] delayed LC can on occasion be technically demanding.[3] In some cases with significant coincident comorbidities, alternative approaches such as percutaneous cholecystostomy (PC) should be considered[4,5] although there is controversy concerning the longer-term outcome of patients treated entirely conservatively.[6,7] The primary use of PC in patients with acute cholecystitis non-responsive to antibiotic therapy has been shown to be safe in ASA Grade III and IV patients where there is a high rate of technical success[8–10] and only a selective need for delayed surgery.[11,12] Procedure-related complications following PC are low[9,11] with particular effectiveness in acalculous cholecystitis where there is a high likelihood that PC alone in this group of patients will be definitive.[12]

There are currently no categorical guidelines beyond consensus opinions for the optimal management approach in AC[13] where it is recognized that patient groups are not strictly comparable and where there has been a shift over time towards the use of PC as a bridge to LC in older and sicker patients.[14] Such a decision should be balanced in higher risk cases since overall, PC-managed patients tend to have an increased risk of in-hospital death, a longer hospital stay and greater total hospital charges.[15] Critical questions concerning management initiated with PC in high-risk cases include the timing of a subsequent LC and indeed, determination of which patients will ultimately require cholecystectomy.[16] This study retrospectively assesses those patients presenting with AC who underwent PC placement at a single tertiary institution, examining their clinical outcome, PC-related complications, recurrent admissions (with AC) and their requirement for delayed cholecystectomy.

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2. Patients and methods

Ethical permission for this retrospective analysis was provided by the local hospital ethics committee. The study, conducted at the Kaplan Medical Center, (a 700 bed tertiary referral center in Israel), included patients admitted with a diagnosis of AC between 1/11/2011 and 1/7/2014. Patients with AC were identified using the ICD disease coding (9th Revision) incorporating codes 574.0, 574.3, 574.6, 574.8, 575.0, 575.12 and 575.4 with the diagnosis made utilizing a combination of patient history, physical examination, laboratory analyses and ultrasonographic and selective CT scan confirmation. All patients with AC were managed with intravenous antibiotics, most commonly using a combination of Cefuroxime (Glaxo Smith Kline, Israel) and Metronidazole (Sanofi Aventis, Israel) with standard analgesics. The indications for PC use were reliant upon surgical discretion.

All PC placements were performed by a consultant interventional radiologist under ultrasonographic or CT guidance. In general, a transhepatic approach to the gall bladder was preferred where a trans-abdominal approach was used if the gallbladder was distended and adherent to the abdominal wall or when unfavourable anatomy precluded a transhepatic approach. Placement of a PC was accomplished under local anesthesia using a Seldinger guidewire technique dilating the tract and deploying either a 6Fr or an 8 Fr pigtail catheter (Argon Medical Devices, Athens, TX USA) depending upon the viscosity of the gallbladder contents. Aspirated bile was sent for bacteriological culture. For the purposes of definition, “early insertion” of a PC was recorded when the drain was placed within 24 h of the admission and confirmation of the diagnosis, with “late insertion” recorded if PC placement was made $\geq$24 h after admission. The principal indication for early PC insertion was for patients deemed high surgical risk with late PC insertions performed in those clinically unresponsive patients or in those cases deteriorating under non-operative management.

All patients are discharged with the PC to open drainage. A cholangiogram is then performed via the PC at 2–3 weeks following discharge. If the cystic duct is patent with no sign of distal obstruction and the patient is fit and willing to undergo an elective cholecystectomy then elective surgery is organized and performed. In these cases the PC tube is closed but left in place until the operation. In those patients where there is a prohibitive risk of surgery deemed to be present (or in those declining surgery), the PC tube is then removed. In those with initial cystic duct obstruction on cholangiography, the PC tube is left open and a repeat cholangiogram is performed in a further 2–3 weeks. If cystic duct obstruction is still evident the tube is left open and elective surgery is organized. Clinical improvement was charted if the patient was discharged from hospital without the need for emergency surgery during the first admission.

Demographic patient data were collected along with laboratory analyses, details of coincident comorbidities, biliary cultures, imaging findings (the presence of gallbladder wall thickening, gallstones, gallbladder distension and a pericholecystic fluid collection) along with the timing of PC placement and removal. Complicated cholecystitis was recorded in all cases where there was gangrenous cholecystitis, emphysematous cholecystitis, empyema and/or a pericholecystic abscess, (all 575.0) or perforation of the gallbladder (575.4). In-hospital peri-procedural mortality was charted for those cases dying before discharge or within 30 days of discharge. Data concerning procedural complications, in-hospital mortality, outcome and elective surgical disposition were all collated. Patients were excluded from analysis if there was a presentation of cholangitis, known choledocholithiasis, associated hepatobiliary malignancy or gallstone pancreatitis. For the purposes of definition, a primary outcome measure included recurrent AC during the period of follow-up after successful PC management, with the secondary outcome measure being the need for interval cholecystectomy.

3. Statistics

The SPSS software (Version 22.0 IBM Armonk, NY) was used for statistical analysis. Categorical data were expressed as means and standard deviations (SD) and compared using the Chi-square or Fisher's exact test where appropriate. Continuous variables were examined by the Wilcoxon rank sum test where a two-tailed P value < 0.05 was considered to be statistically significant.

4. Results

Over the period of the study, the overall number of AC admissions to the hospital was 678 with 119 (17.6%) undergoing PC placement. These latter analysed cases included 52 females (43.7%, mean age 77.9 years) and 67 males (56.3%, mean age 74.2 years) with a total mean age of 75.8 years ($\pm$13.6 years). All cases of AC were due to calculous cholecystitis with a median symptom duration of 2 days (range 1–14 days). The median time between the commencement of symptoms and PC insertion was 4 days (range 1–17 days). Table 1 shows the clinical demographics for the patient cohort. There were 14 cases (11.8%) with high risk imaging findings including one suspected perforation, one pericholecystic abscess and 12 (10.1%) suspected cases of necrosis of the gallbladder wall. Table 2 shows the results of bile cultures at the time of PC insertion. Overall, bile culture results were obtained in 69 patients (58%) with 52 positive culture sets out of the total cohort (43.7%), representing 75.4% of those cases cultured. The main organisms isolated were *Klebsiella pneumoniae* and *E. coli* with *E. coli* representing slightly less than half of the positive cultures.

Although there was no set Unit policy towards emergent cholecystectomy following PC deployment, indications to move towards surgery included those patients with septic shock despite PC drainage and antibiotics (3 patients), b) those who did not display clinical improvement after PC deployment (5 patients) and c) those with cholecystographic evidence of gallbladder perforation despite PC placement (2 patients). Fig. 1 shows a flow chart of the outcome of the 119 patients presenting with AC who underwent initial PC placement. Of the study group patients, 103 experienced clinical improvement with PC insertion and all of these cases were discharged without any mortality. The mean hospital stay of the 112 surviving patients was 7.4 days (range 2–34 days). There were 10 patients (9.7%) who underwent emergency surgery during their first admission and 6 (5.8%) following a subsequent admission. In the emergent surgery group, there were 4 patients treated

Table 1
Clinical characteristics of enrolled patients.

Characteristics	Total (n = 119)
Age, years (SD)	75.8 (13.6)
Male, n (%)	67 (56.3)
Comorbidity, n (%)	
Diabetes mellitus	45 (37.8)
Hypertension	80 (67.2)
Ischemic heart disease	33 (27.7)
Congestive heart failure	9 (7.6)
Hyperlipidemia	48 (40.3)
Dementia	16 (13.4)
Atrial fibrillation	15 (12.6)
Chronic renal failure	13 (10.9)
Chronic obstructive airways disease	3 (2.5)
Cerebrovascular accident	13 (10.9)
Hyperthyroidism	8 (6.7)