

Perioperative outcomes of delayed laparoscopic cholecystectomy for acute calculous cholecystitis with and without percutaneous cholecystostomy

Ido Mizrahi, MD, Haggi Mazeh, MD, Jonathan B. Yuval, MD, Gidon Almogy, MD, Miklosh Bala, MD, Natalia Simanovski, MD, Nadeen Abu Ata, MD, Eran Kuchuk, Jacob Rachmuth, MD, Aviram Nissan, MD, and Ahmed Eid, MD, Jerusalem, Israel

Introduction. The role of percutaneous cholecystostomy (PC) in the management of patients with acute calculous cholecystitis (ACC) remains controversial. The aim of this study is to report operative outcomes in a large cohort of patients undergoing PC before their delayed laparoscopic cholecystectomy (DLC).

Methods. All patients who underwent DLC because of ACC between 2003 and 2012 were included. Outcomes of patients with and without previous PC were compared.

Results. Of 639 patients who underwent DLC because of ACC at our institution during a 10-year time interval beginning 2003, 163 (25.5%) patients had PC before their DLC. Patients who underwent PC were older (64 ± 1 years vs 48 ± 0.8 years, $P < .001$) and had more comorbid conditions ($P < .001$). Accumulated duration of stay was longer in the PC group (16.2 ± 0.4 days vs 9.7 ± 0.1 days, $P < .001$). Rate of conversion to open procedure was greater in the PC group (11% vs 4%, $P = .001$) and operative time was longer (142 ± 4 minutes vs 107 ± 4 minutes, $P < .001$). Patients in the PC group had a greater rate of biliary-related complications (10% vs 4%, $P = .003$) and surgical-site infections; both superficial (5% vs 1%, $P = .004$) and deep (7% vs 3%, $P = .04$). On multivariable analysis PC was an independent risk factor for conversion to open cholecystectomy (odds ratio 2.67 95% CI 1.18–6.72) as well as to biliary-related complications (odds ratio 4.85 95% CI 1.57–14.92).

Conclusion. DLC for ACC in patients with previous PC is associated with longer duration of stay, more readmissions, and, most importantly, greater conversion rate, biliary related complications, and surgical-site infections. (*Surgery* 2015;158:728-35.)

From the Department of Surgery and Radiology, Hadassah-Hebrew University Medical Center, Jerusalem, Israel

IN DEVELOPED COUNTRIES ACUTE CALCULOUS CHOLECYSTITIS (ACC) IS ONE OF THE MOST PREVALENT DISEASES in surgery, posing a major health and socioeconomic burden.¹ It is the third most-common cause of emergency admission to surgery wards, and its incidence increases with age. It is estimated that approximately 20–25 million adults in the United States are afflicted with gallstones

and approximately 262,411 hospitalizations during the year 2000 were for ACC.²

The standard treatment of ACC is laparoscopic cholecystectomy (LC). It is estimated that approximately 1.5 million and 60,000 LC procedures are performed annually in the United States and in the United Kingdom, respectively,^{3,4} but controversy still exists regarding the ideal timing of surgery. Two major approaches are practiced: early LC (during the index admission) and delayed laparoscopic cholecystectomy (DLC, ie, management with NPO and antibiotics until resolution of the inflammation during the index admission followed by cholecystectomy, several weeks later). A recently published, large-scale meta-analysis, as well as prospective, and retrospective trials have shown inconsistent results regarding the superiority of either approach.^{1,4-6}

Percutaneous cholecystostomy (PC) has been described as a therapeutic modality in high-risk

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Reprint requests: Haggi Mazeh, MD, Department of Surgery, Hadassah-Hebrew University Medical Center, P.O.B. 24035, Mount Scopus, Jerusalem 91240, Israel. E-mail: hmazeh@hadassah.org.il.

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patients (ie, “bridge to surgery”), in those who fail to improve under conservative management, and in those with advanced gallbladder disease,⁷ but it is accompanied by a longer hospital stay, more readmissions from biliary complications, and increased 30-day rates of morbidity and mortality.⁷⁻⁹ Several studies have reported operative outcomes after PC. These studies, however, are limited to relatively small cohorts, ranging from 31 to 72 patients, and lack consistency regarding delayed versus early LC approach.¹⁰⁻¹³ Therefore, there is no conclusive data to date regarding the impact of PC on operative outcomes specifically when DLC is performed. Centers of excellence that perform early LC do not encounter a sizeable cohort of patients who require PC and are unable to compare outcomes for 2 reasons. First, because most patients undergo early cholecystectomy, the number of patients who require PC decreases substantially. Second, patients without PC undergo early cholecystectomy and therefore there is no substantial cohort of patients without PC who undergo DLC.

At our institution, the DLC approach is practiced routinely, because of institutional logistical considerations influenced mainly by operating room availability. Naturally, this approach allows us to encounter a large number of patients undergoing PC and we are able to compare their outcomes with a large cohort of patients who undergo DLC without PC. The aim of this study is to report operative outcomes of DLC on the largest cohort, described to date, of patients after PC.

METHODS

The study was reviewed and approved by the Institutional Review Board at Hadassah Hebrew University Medical Center, before the initiation of data collection. A database was created containing all consecutive patients who underwent cholecystectomy because of ACC between January 1, 2003, and December 31, 2012. Of these, all patients who underwent PC tube insertion before surgery were identified. Patients were identified on the basis of Current Procedural and Terminology Codes, and according to the *International Statistical Classification of Diseases, 9th Revision*. ACC was defined based on the previously published Tokyo Criteria.¹⁴ The decision to perform PC was at the discretion of the surgery team, mainly as a bridge to surgery in high-risk patients or in those who did not sufficiently improve under medical therapy. All cholecystostomy tubes were performed percutaneously under the guidance of ultrasonography or computed tomography by a senior radiologist. Before

surgery, if the surgery team had concerns of cholelithiasis, an endoscopic retrograde cholangio-pancreatography (ERCP) was scheduled and a stent inserted. LCs were conducted according to the widely accepted 4-port surgical technique.

The records of patients were reviewed for baseline characteristics, clinical presentation, and laboratory results during the index admission. Patient characteristics included age, sex, comorbidities, previous biliary symptoms, and previous surgery history. Clinical presentation was evaluated for the presence of concurrent cholangitis as determined clinically by “Charcots’ triad” or “Reynolds’ pentad,” pancreatitis, pertinent physical examination, radiologic findings, as well as laboratory results.

Data were recorded for patients requiring PC during their index admission. In patients undergoing PC, events of accidental ejection of the tube, peri-tubal leakage, bleeding, and the need for reinsertion of another tube were recorded. The interval period between the index admission and surgery was evaluated for recurrent episodes of ACC and other biliary related complications. Operative reports were reviewed to identify operative time, conversion to an open surgery, and intraoperative complications, mainly bleeding and iatrogenic bile duct injury. Postoperative course was examined for complications within 30 days of surgery. Biliary related complications were classified according to the Strasberg classification.¹⁵ Additional complications recorded included SSI, need for operative or ERCP interventions, and mortality. Accumulated duration of stay (DOS) was defined for both groups as the sum of all admission days.

To identify differences between the 2 groups, univariate analysis with χ^2 and *t* test were used as appropriate. Statistical calculations were completed using statistical software SPSS version 20 (SPSS, Inc., Chicago, IL). Data are presented as the median or mean \pm standard error of mean, as appropriate.

To identify factors associated with conversion to open surgery and biliary-related complications, univariate analysis was performed with χ^2 and *t* test. Multivariable logistic regression analysis was then performed to determine independent predictors for these 2 specific outcomes. All preoperative variables achieving statistical significance at a 0.05 level in the univariate analysis were considered for the multivariable analysis. Odds ratios (ORs) with 95% confidence intervals (CIs) are reported.

RESULTS

A total of 639 LCs were performed at our institution during the study period. The cohort

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