



Southwestern Surgical Congress: Quick-Shot Presentations

The difficult gall bladder: Outcomes following laparoscopic cholecystectomy and the need for open conversion[☆]

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ARTICLE INFO

Article history:

Received 19 April 2016

Received in revised form

2 September 2016

Accepted 4 September 2016

Keywords:

Gallbladder

Laparoscopic surgery

Cholecystectomy

Conversion to open

ABSTRACT

Introduction: Surgery for the difficult gallbladder (DGB) is associated with increased risk compared to more routine laparoscopic cholecystectomies (LC). Laparoscopic “damage control” methods including cholecystostomy, fundus-down approach and subtotal cholecystectomy (SC) have been proposed to avoid conversion to open. We hypothesized that a Total LC (TLC) for DBG can be completed safely with an acceptably low conversion rate.

Material and methods: All patients that underwent LC from January 2005–June 2015 were retrospectively reviewed. Cases met criteria for DGB if they were necrotic/gangrenous, involved Mirizzi syndrome, had extensive adhesions, were converted to open, lasted more than 120 min, had prior tube cholecystostomy or known GB perforation.

Results: A total of 2212 patients underwent LC during the study time period, of which 351 (15.8%) met criteria for DGB. Of these cases, 213 (60.7%) were admitted from the emergency department and 67 (19.1%) underwent urgent/emergent cholecystectomy (within 24 h). Additionally 18 (5.1%) had pre-operative tube cholecystostomies. Seventy patients (19.9%) were converted to open. Indications for conversion included severe inflammation/adhesion (n = 31, 46.3%), difficult anatomy (n = 14, 20.9%) and bleeding (n = 6, 9.0%). Predictors for conversion included urgent/emergent intervention (OR, 0.80; 95% CI 0.351–0.881, p = 0.032), previous abdominal surgery (OR, 2.18; 95% CI, 1.181–4.035, p = 0.013) and necrotic/gangrenous cholecystitis (OR, 1.92; 95% CI, 1.356–4.044, p = 0.033). Comparing the TLC and the conversion groups, mean operative time and length of hospital stay were significantly different; 147 ± 47 min vs 185 ± 71 min; p < 0.005 and 3 ± 2 days vs 5 ± 3 days; p = 0.011, respectively. There was no significant difference in postoperative hemorrhage, subhepatic collection, cystic duct leak, wound infection, reoperation and 30 day mortality. There was no bile duct injury in either group.

Conclusion: Total laparoscopic cholecystectomy can be safely performed in difficult gallbladder situations with a lower conversion rate than previously reported. Possible predictors of conversion include urgency, necrotic gallbladder and history of prior abdominal surgeries. For patients converted to open, similar morbidity and mortality can be expected.

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1. Introduction

Gallstone disease affects up to 4% of Western population and 10%–15% of people during their lifetime.¹ Based on a recent epidemiological review, this corresponds to 6.3 million men and 14.2 million women aged 20–74 years in the United States.² After

the introduction of laparoscopic cholecystectomy (LC) in the mid-1980s, it became the standard surgical intervention for gallstone disease.³ However, when the “critical view of safety” cannot be obtained, conversion to open surgery is recommended to prevent bile duct injury, especially in cases of “difficult gallbladder”.⁴

“Difficult gallbladder” (DGB)^{5,6} corresponds to a procedure with an increased surgical risk compared to standard cholecystectomies and has been reported with an incidence up to 26% in large series.⁷ It is usually associated with severe inflammation (acute cholecystitis, empyema, gangrene, perforation, Mirizzi syndrome) that

[☆] The study was an oral presentation at Southwestern Surgical Congress, 2016 Annual Meeting, San Diego, CA, USA.

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renders the dissection extremely difficult, alters the anatomy and increases the risk of bleeding.^{5,6} As a majority of the newer surgeons have little experience with open cholecystectomies, conversion in these cases may prove to be even harder with the potential of causing more damage than good.⁸

Various “damage control” procedures, such as cholecystostomy (percutaneous or trocar site), fundus first approach, subtotal cholecystectomy and more recently, an “inside approach” has been proposed to reduce the risk of intraoperative complication.^{9–11} Subtotal cholecystectomy removes portions of the GB when the structures of the Calot triangle cannot be identified and the critical view of safety cannot be achieved.⁸ We hypothesized that LC can be accomplished in patients with DGB with a low conversion rate and minimal need for damage control while identifying the predictors that lead to conversion.

2. Materials and methods

2.1. Study design

All patients who underwent LC from 2005 till 2015 were retrospectively reviewed from a prospective surgical database at Mayo Clinic Hospital in Arizona. Operative Notes were used to determine the following inclusion criteria for DGB; “necrotic, gangrenous or perforated” GB, extensive lysis of adhesions, prior cholecystostomy tube insertion, Mirizzi syndrome, and conversion to open. Operative time of greater than 120 min was used as an indicator only when patients fulfilled one other inclusion criteria other than conversion to open. Institutional Review Board approval was obtained prior to commencing the study and consent was waived on de-identification of patients.

2.2. Study variables

Electronic medical records were reviewed to obtain demographics; including age, gender, comorbidities, use of immunomodulators/steroids, history of cirrhosis, urgent nature of surgery, and any previous abdominal surgery. Operative variables included length of operation, number converted to open, indications for conversion and use of intraoperative cholangiogram. Postoperative variables included length of hospital stay, systemic complications such as myocardial infarction, stroke, pulmonary embolism, pneumonia, sepsis; and procedure related complications such as hemorrhage, subhepatic collection, bile leak, iatrogenic bile duct injury, and reoperations and mortality.

2.3. Study statistics

Data entry and analysis was done using Statistical Packaging for Social Sciences v 22.0 (SPSS Inc. Chicago, IL). Categorical variables are summarized as numbers and percentages and continuous variables as mean \pm standard deviation. Differences between the groups were measured using chi-square and Student's t-test wherever appropriate. A p value of <0.05 was considered significant. To identify predictors for conversion to open, univariate and multinomial logistic regression analysis was performed.

3. Results

3.1. Patient demographics

A total of 2212 patients underwent LC during the study time frame of 10 years, out of which 351 (15.8%) met our criteria for difficult gallbladder (Table 1). Among patients with DGB, the mean age of the patients was 70.3 ± 15.5 years and the majority were

Table 1
Patient demographics.

Variables	N (%)
Difficult Gallbladder	351 (15.8) ^a
Mean Age (years), mean \pm SD	70.3 \pm 15.5
Status	
Elective	284 (80.9)
Urgent/Emergent	67 (19.1)
Race	
Caucasian	325 (92.6)
Asian	10 (2.8)
Others	16 (4.6)
Gender	
Male	229 (65.2)
Female	122 (34.8)
Comorbidities ^b	
CAD	78 (22.2)
CVA	29 (8.3)
CKD	27 (7.7)
A Fib	26 (7.4)
Anticoagulation	36 (10.3)
DM	68 (19.4)
Obesity	31 (8.8)
Immunomodulators/steroids	57 (16.2)
Cirrhosis	10 (2.8)
Previous abdominal surgery	125 (35.6)
Percutaneous cholecystostomy tube	18 (5.1)

^a 15.8% of the total patient population (n = 2212).

^b CAD=Coronary Artery Disease, CVA=Cerebrovascular Accident, CKD=Chronic Kidney Disease, A fib = Atrial Fibrillation, DM = Diabetes Mellitus.

Caucasian (n = 325, 92.6%) and males (n = 229, 65.2%). Most of the patients were admitted from the emergency department (n = 213, 60.7%) and 67 (19.1%) patients underwent urgent/emergent surgical intervention. Among the comorbidities studied, coronary artery disease was the most common (n = 78, 22.2%) followed by diabetes (n = 68, 19.4%). Immunomodulators or steroids were used by 57 (16.2%) patients and 36 (10.3%) patients were on anticoagulation. A total of 125 (35.6%) patients had undergone previous abdominal surgery and 18 (5.1%) had percutaneous cholecystostomy tube placement.

3.2. Operative details

A total of 70 (19.9%) patients were converted to open (Table 2). Indications for conversion included severe inflammation and adhesions around the gallbladder rendering dissection of triangle of Calot difficult (n = 37, 11.1%), altered anatomy (n = 14, 4.2%) and intraoperative bleeding that was difficult to control laparoscopically (n = 6, 1.8%). The remaining 13 (18.5%) patients included a combination of cholecystoenteric fistula, concern for malignancy, common bile duct exploration for stones and inadvertent enterotomy requiring small bowel repair. Intraoperative cholangiogram was performed in 123 (35%) patients, out of which 24 (19.5%) had

Table 2
Operative details.

Variables	N (%)
Operative time (minutes), mean \pm SD	154 \pm 55
Conversion to open	70 (19.9)
Indications for conversion ^a	
Severe inflammation and adhesion	37 (11.1)
Altered anatomy	14 (4.2)
Bleeding	6 (1.8)
Intraoperative cholangiogram	123 (35)
Filling defects	24 (19.5)
Intraoperative stone retrieval	11 (45.8)

^a Details of the remaining 13 (18.5%) are included in the Results Section.

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