

Laparoscopic Cholecystectomy: A Retrospective Audit from The Cayman Islands

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Citation

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Abstract

Laparoscopic cholecystectomy (LC) brings numerous advantages over open cholecystectomy at the expense of higher complication rates. There have been no prior reports on the outcomes of LC from the Cayman Islands. A three year retrospective audit was performed at the Cayman Islands Hospital in Grand Cayman.

Of 110 cholecystectomies, 99 were attempts at LC in 83 females and 16 males. Operations were performed electively in 85% of cases and emergently in 15%. Same day discharge was possible in 19.6% of cases.

There were 2 conversions (2.02%) and LC was successfully completed in the remaining 97 patients with an average operating time of 93.74 \pm 21.72 minutes (mean \pm SD). Intra-operative cholangiography was performed in 12 elective cases and added 32.09 minutes of operating time. Two patients had laparoscopic bile duct exploration and stone extraction that added 37.67 minutes of operating time.

Eight patients experienced morbidity that included bleeding (4), biliary peritonitis (2), visceral injury (1) and pneumonia (1). There was no bile duct injury, wound infection or mortality in this audit.

LC is being performed in this setting with acceptable morbidity, mortality and conversion rates. A concerted effort to increase the performance of ambulatory LC may increase cost effectiveness in this setting.

INTRODUCTION

Since its introduction, LC has taken the surgical community by storm and has now become the gold standard operation for symptomatic cholelithiasis. Several trials have demonstrated the advantages of the laparoscopic approach including reduced post-operative pain, recovery time and duration of hospitalization.^(1,2,3,4,5) There is also a patient driven demand because they rapidly return to normal activity and find it aesthetically gratifying.

Although there is a greater incidence of complications from LC than from open cholecystectomy (OC), the benefits outweigh these risks.^(1,2,3,4,5) There have been no prior reports on LC from the Cayman Islands. We carried out an audit to document the outcomes after LC in this setting.

METHODS

The Cayman Islands Hospital is the main tertiary referral center in the Cayman Islands. It is located on the island of Grand Cayman and serves a population of approximately 40,000 persons.

In this setting, patients were offered cholecystectomy based

on historic and/or sonographic evidence of symptomatic gallstone disease (biliary colic, cholecystitis, pancreatitis or choledocholithiasis) or evidence of gallbladder polyps. All patients who required cholecystectomy were offered LC as an alternative to OC and the final decision was patient-based.

Qualified surgeons performed all the operations using minor modifications of the standard four port technique. The decision to employ antibiotic prophylaxis was made by the attending surgeon on an individualized basis, but they were generally not utilized for routine uncomplicated cases. The laparoscope was introduced into the peritoneal cavity through an umbilical incision either using the open Hasson's technique or after establishing a pneumoperitoneum with a Veres needle. The pneumoperitoneum was maintained at 15mmHg. Under laparoscopic vision, three working ports were inserted at the upper abdomen. Two opposing laparoscopic towers were used to facilitate unimpeded vision for the surgical team.

Retrograde dissection was utilized to identify the cystic artery and cystic duct. The structures were individually ligated prior to dissection of the gallbladder from the liver

bed with electrocautery. Intraoperative cholangiography (IOC) was performed selectively for a clinical or biochemical suspicion of choledocholithiasis.

Immediately after LC, nasogastric tubes were routinely removed and patients fed a normal diet. Parenteral opioid analgesia was administered on demand post-operatively. Patients were discharged once diet was tolerated and followed up in the outpatient clinic setting.

In this audit, the operative log at the Cayman Islands Hospital was examined from December 2004 to December 2007. The hospital records of all patients who had LC were retrieved and data were extracted. The data collected included patient demographics, indications for operation, time intervals between presentation and treatment, intra-operative details, morbidity and mortality.

RESULTS

During the study period, 110 patients had cholecystectomy. Of this, there were 99 attempts at LC and 11 patients had initial attempts at OC. The indications for LC are outlined in Table 1.

Figure 1

Table 1: Indications for Laparoscopic Cholecystectomy

Indications for Cholecystectomy	No.
Symptomatic cholelithiasis	54
Chronic cholecystitis	13
Biliary colic	12
Acute cholecystitis – emergent	11
Acute cholecystitis – urgent <6 Wk	2
Gallbladder empyema – emergent	3
Gallbladder polyps	3
Gallstone pancreatitis	1
Total	99

The patients presented to hospital 3.5 +/-3.2 months (mean +/-SD) after first experiencing gallstone related symptoms. There were 83 females and 16 males with an overall female to male ratio of 5:1. The average age of female patients was 38.8 +/-12.8 years (age +/-SD) and was slightly lower than that of males (40.8 +/- 13.6 years).

Operations were performed emergently in 15% of cases 2.1 +/-0.7 days (mean +/-SD) after presentation to hospital. The remaining operations were performed electively 23.3 +/-19.6 days (mean +/- SD) after presentation.

Conversion to OC was required in two patients. The first was a 39-year-old man who had emergent operation for gallbladder empyema. Oedema within Calot's triangle precluded clear identification of biliary structures. The second patient was a 45-year-old female who had prior abdomino-perineal resection of rectal carcinoma and subsequent colostomy revision. Dense upper abdominal adhesions precluded safe dissection in Calot's triangle.

In the remaining 97 patients, LC was successful with an average operating time of 93.74 +/-21.72 minutes (mean +/-SD). In comparison, the duration of OC was 104.82 +/-24.50 minutes (mean +/-SD). Laparoscopic IOC was performed in 12 elective cases with an average operating time of 120.83 +/-27.28 minutes (mean +/-SD). The difference between these values was used to determine the duration of IOC that was estimated to add 32.09 minutes of operating time.

Common bile duct stones (CBDS) were identified in 2 cases. Both patients had laparoscopic common duct exploration and successful stone retrieval via a supra-duodenal choledochotomy. The duration of the entire procedure was 163.5 +/-44.55 (Mean +/-SD) minutes. By calculating the difference in duration between exploration and LC with IOC, it was estimated that laparoscopic common duct exploration added 37.67 minutes to the operating time. In both cases, the common bile duct was closed over a T-tube. One of these patients developed biliary peritonitis and required laparoscopic re-exploration. A bile leak from a dislodged T-tube was discovered. The T-tube was replaced after adequate peritoneal toilet and the remaining post-operative course was uneventful.

Overall, 8.1% of patients experienced a complication as outlined in Table 2. No wound infections were noted despite the omission of antibiotic prophylaxis in 15.5% of cases. When utilized, antibiotics were administered as a single pre-operative prophylactic dose in 68 cases, as "extended" prophylaxis for up to 48 hours in 8 cases and over 3 days in 5 cases.

Figure 2

Table 2: Outcomes after Laparoscopic Cholecystectomy

Complication	N (%)
Minor Morbidity	4 (4.04%)
Haemorrhage	4
Wound infection	0
Major Morbidity	4 (4.04%)
Biliary Peritonitis	
• Dislodged T-tube	1
• Accessory ducts at liver bed	1
Pneumonia	1
Bile Duct Injury	0
Visceral Injury	
• Partial small bowel tear	1
Mortality	0

The average duration of hospitalization after LC was 1.61 days. Same day discharge was possible in 19.6% (18/92) of patients having LC. Patients were discharged from hospital within 24 hours in 44.6% (41/92) cases, within 48 hours in 20.7% (19/92) cases and over 3 days in 15.2% (14/92) of cases.

DISCUSSION

Several well-designed prospective randomized trials have demonstrated the superiority of LC over mini-open cholecystectomy.^(1,2,3,4,5) Despite this, many patients in the Caribbean still choose OC due to financial constraints and long waiting lists.^(6,7) A recent report originating in Jamaica documented that the mean interval between presentation to hospital and completion of LC was 116 days, prompting patients to choose the open approach in 14% of cholecystectomies.⁽⁶⁾ The short waiting time in this audit (23 days) should allow more patients to enjoy the benefits of LC.

Up to 33% of the patients who had OC in the Jamaican report cited financial constraint as the reason for their choice, despite the cost of LC being heavily subsidized.⁽⁶⁾ This reflects the status in many Caribbean countries where health care systems are under-funded and operate with limited resources.^(6,7,8,9) It is true that there is a higher operating theatre cost associated with LC than the conventional open approach. However, we must realize that the overall costs are lower because there are savings in post-operative management from reduced hospitalization, analgesic requirements and time lost from work.^(1,2,3,4,5,6,7) In this audit, a large proportion of patients enjoyed the

benefits of LC. One possible explanation is that more patients can afford LC since the mandatory health insurance law requiring all residents of the Cayman Islands to have minimum private sector health insurance became effective in July 1997.⁽¹⁰⁾ In contrast, only a fraction of the population in Jamaica had any health insurance.^(8,9)

Outpatient LC has been becoming increasingly popular over the past decade due to its proven safety and the potential for greater cost containment.^(6,11) A 10-year meta-analysis of 2,119 operations across 16 studies demonstrated the safety of ambulatory LC with 0.5% morbidity, 4.9% unplanned admissions and 1.8% re-admissions.⁽¹¹⁾ Only 19.6% of our cases were performed as ambulatory LC with no re-admissions and no morbidity. Concerted efforts to increase the proportion of outpatient LC may be one area in which we may improve cost savings, especially with the majority of cases being performed electively.

Emergent LC was performed in 15% of cases for acute inflammatory processes. These patients were once thought to be unsuitable for LC due to anticipated technical difficulties from tissue friability, oedema and hemorrhage. They were traditionally treated with OC or managed non-operatively and offered interval LC six weeks after resolution of the inflammatory process.⁽¹²⁾

This strategy has now largely been abandoned. The latest Cochrane database systematic review examined 451 patients with acute cholecystitis across five prospective randomized trials that were randomized to early versus delayed LC for acute cholecystitis.⁽¹²⁾ Early LC was recommended as the standard of care because it significantly reduced hospitalization by four days without any difference in the incidence of bile duct injury, morbidity or conversions. Moreover, it avoided the need for emergency operations in 17.5% cases for recurrent or unresolved cholecystitis.⁽¹²⁾ In this audit, 88% of patients with acute inflammatory processes had emergent LC and this is in keeping with modern standards of surgical practice.

In our series, 2.1% of operations required conversion to OC for unclear biliary anatomy. This is in keeping with the 2-5% acceptable conversion rates that are reported from larger series.^(14,15,16,17) Some factors that have been noted to herald difficult operation and increased conversions include older age, male gender, long symptomatic intervals, dense adhesions, peri-portals obesity and portal lymphadenopathy.^(6,18,19) Our sample size is too small to determine significance in any of the characteristics of

patients requiring conversion.

Conversion rates have been noted to be particularly high during emergent LC for acute cholecystitis. In a 3-year meta-analysis across 84 studies, Krahenbuhl et al (¹⁹) reported greater conversion rates (20%) with 2,207 LCs for acute cholecystitis compared to 9,904 LCs without acute inflammation (7%). Our experience was similar, with conversions in 7.1% of patients having emergent LC for acute inflammatory diseases compared to 1.2% for all other indications.

Overall morbidity in this audit (8.1%) is higher than the 2-6% morbidity that is reported from high volume centers.^(14,15,17) But our results compare favorably to other small series encompassing 100 cases or less where overall morbidity ranges from 8%⁽¹⁶⁾ to 12%.⁽¹³⁾

Recent evidence from five prospective randomized trials has shown that antibiotic prophylaxis is not necessary to prevent wound infection after LC.^(20,21,22,23,24) Al-Ghnam et al (²⁶) performed a meta-analysis of these 5 trials and demonstrated that 528 patients who received prophylaxis had no difference in wound infections (1.5%) compared to 371 patients who had prophylaxis omitted (2.1%). In this audit, no wound infections were encountered despite a range of different practices. There may be room to standardize the practice regarding antibiotic prophylaxis.

There were no reports of any patient requiring endoscopic or surgical intervention for retained CBDS with the protocol of selective IOC. The practice of routine laparoscopic IOC is no longer in vogue because the mere activity of encircling and clipping a duct could incite damage if it is not the cystic duct.⁽²⁶⁾ Additionally, routine laparoscopic IOC in the Caribbean setting increases cost by \$375 US per procedure⁽¹³⁾ and added 32 minutes of operating time in this audit.

The detection of unsuspected CBDS during LC has been touted as justification for routine IOC.⁽²⁷⁾ But, two prospective trials have revealed that there is a low incidence of unsuspected CBDS detected on routine laparoscopic IOC ranging from 2.1%⁽²⁸⁾ to 2.3%⁽²⁹⁾ of cases.

Moreover, evidence is emerging that most retained CBDS remain clinically silent.^(27,28,29) In an eleven-year prospective study of 962 operations with routine laparoscopic IOC, Collins et al. identified 46 patients with proven CBDS.⁽²⁹⁾ They made no attempt at extraction and left indwelling cholangiogram catheters in situ. At six

weeks, 24 (52%) of these patients had asymptomatic spontaneous stone passage. The remaining patients were asymptomatic until the CBDS were electively extracted at ERCP. Even in 2 patients that had unsuccessful ERCP, retained CBDS remained clinically silent up to 5 years of follow-up.⁽²⁹⁾

Some authorities have moved even further by suggesting that intra-operative diagnosis is unimportant, and that patients with proven retained CBDS should be subjected to ERCP for duct clearance only if they become symptomatic.^(29,30) In one small prospective study, 22 patients with documented CBDS on IOC were subjected to either routine or “on-demand” post-operative ERCP.⁽³⁰⁾ Expectant management significantly reduced hospitalization (1.5 vs. 5 days), cost (£1,508 vs. £2,669) and readmission rates without increasing morbidity or mortality.⁽³⁰⁾ Using this protocol, Collins et al. calculated that expectant management of CBDS for six weeks would prevent unnecessary ERCP in 63% of cases in their study.⁽²⁹⁾ The regional data on ERCP has already been documented and is comparable to large volume centers, with 79% successful duct clearance and 6.95% overall morbidity.⁽³⁰⁾

The selective IOC protocol identified CBDS in two cases. In both cases there was successful extraction during laparoscopic common duct exploration with closure over a T-tube. The efficacy of this procedure has already been documented in surgical literature. A collective review of 573 cases across 13 trials revealed that trans-ductal laparoscopic common duct exploration had 95–98.5% stone clearance, with 5-7% morbidity and 1-2% mortality.⁽³²⁾

Trans-ductal duct exploration requires considerable technical expertise and equipment. Trans-cystic stone extraction is an option that is technically simpler, but it is better suited for CBDS smaller than 9mm that are distal to the cystic duct junction.^(32,33) The details of the CBDS encountered could not be ascertained in this type of study.

A review of the Caribbean literature yielded no prior reports of laparoscopic management of intra-operatively detected CBDS to date, despite the proven advantages of this management method. Both methods allow single stage treatment of CBDS with less cumulative morbidity than pre-operative ERCP and the T-tubes can be utilized post-operatively to facilitate extraction of retained stones under fluoroscopic guidance.^(32,33)

CONCLUSIONS

At this institution, LC is being performed with acceptable rates of conversion, morbidity and mortality. There may be room for improvement by standardizing antibiotic practice.

Additionally, a potential avenue for cost savings may be to increase the performance of ambulatory LC.

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