DOI:10.1111/hpb.12415 HPB

ORIGINAL ARTICLE

Safety and efficacy of a laparoscopic cholecystectomy in the morbid and super obese patients

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Abstract

Background: Although a laparoscopic cholecystectomy (LC) is the gold standard treatment for symptomatic cholelithiasis, its safety and efficacy in the morbidly/super obese patients is unknown. The aim of this study was to investigate the safety and efficacy of an elective LC in the morbid/super obese patients.

Methods: A retrospective review of the hospital electronic database and medical records was conducted searching for all elective LC from 2010 to 2013. The data collected included patient demographics and body mass index (BMI), length of hospital stay (LOS), duration of surgery (DOS), intra- and post-operative complications, bile duct injuries, performance of an intra-operative cholangiogram, the incidence of open conversion and the seniority of the operator.

Results: A total of 799 patients (76% female) with a mean age of 46 years and BMI of 31 were included in this study. There were significant differences in the median DOS between the three BMI groups; BMI < 26 [64 min; interquartile range (IQR) 54–83]; BMI 26–40 (72 min, IQR 58–91) and BMI > 40 (82 min, IQR 63–104), $P < 0.001$. There were no statistically significant differences in the LOS, peri-operative complication rates, open conversions or bile duct injuries among the BMI groups.

Conclusions: This study showed that LC can be performed safely in the morbid/super obese patients.

Received 27 October 2014; accepted 28 February 2015

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Introduction

A laparoscopic cholecystectomy (LC) has been established as the gold standard treatment for symptomatic cholelithiasis. Numerous large series has proven the safety and efficacy of this procedure. The overall morbidity and mortality rate is 5–10% and 0.1% respectively, and an open conversion rate of 5–10% is commonly reported.[1–3]

One of the risk factors for cholelithiasis is obesity, the incidence of which is increasing worldwide. [4] Therefore, surgeons are increasingly likely to encounter a growing number of obese patients who require a cholecystectomy for symptomatic cholelithiasis. Traditionally obesity has been considered a relative contraindication to LC, as the technical difficulties associated with this procedure in these patients were thought to be associated with higher morbidity and mortality as well as increased open conversion rates.[5]

However, with increasing experience in laparoscopic surgery and the development of better instruments, the practice of LC in the obese patients is growing. Several recent studies have reported that LC is feasible and can be safely performed in the obese patients.[6–8] These studies have shown that obesity was not associated with higher complication or open conversion rates, and the length of hospital stay (LOS) was equivalent when compared to the non-obese patients. The only consistently reported difference in the literature between the two groups of patients was a longer operating time in the obese patients.

Although there is growing evidence on the safety and efficacy of LC in the obese patients, there is a lack of data on its use in the morbid/super obese [body mass index (BMI) > 40] patients. A review of the literature found only one study which compared laparoscopic to open cholecystectomy in patients with BMI > 50.[9] Laparoscopic surgery was found to be associated with a shorter operating time and LOS, as well as reduced peri-operative complication rates.

The purpose of this study was to investigate the safety [peri-operative morbidity and mortality and the incidence of bile

duct injuries (BDI)] and efficacy (duration of surgery, LOS and open conversion rates) of an elective LC in the morbid/super obese patients (BMI > 40) compared to patients with a BMI < 26 and a BMI 26–40.

Methods

A review of a prospectively maintained electronic database and the medical records for all elective LC performed from July 2010 to September 2013 at a teaching hospital in Adelaide, South Australia was undertaken. The data collected include patient demographics and BMI, LOS, duration of surgery (DOS), intra- and post-operative complications, bile duct injuries, performance of an intra-operative cholangiogram, the incidence of open conversion and the seniority of the operator.

The patients were divided into three groups: BMI < 26, BMI 26–40 and BMI > 40. The LOS was calculated from the day of admission until discharge while the duration of surgery was from the initiation of skin incision to the end of skin closure. Any occurrence of intra-operative complications and/or conversion to open surgery was documented. After discharged from the hospital the patients were regularly followed-up in the outpatient clinic between 4 and 8 weeks, therefore allowing assessment of morbidity and mortality up to 30-days. Post-operative complications were graded according to the Dindo–Clavien[10] classification, and bile ducts injuries according to the Strasberg[11] classification, respectively. The operators were divided into three groups: consultant surgeons, fellows with a fellowship from theRoyal Australasian College of Surgeons or equivalent qualification or surgical trainees in a 5-year General Surgery training programme.

The LC technique used at the authors' institution consists of a standard four trocars approach. An open cut down technique is used to create a pneumoperitoneum, usually starting in the peri-umbilical area where a 12-mm port is used for the laparoscopic camera. In the obese patients, the camera port is usually placed supra-umbilically in closer proximity to the gallbladder, and additional trocars may need to be inserted to assist with retraction of the liver, omentum and/or bowel loops as required. Patients were positioned in steep reverse Trendelenburg to help displace the omentum and bowel loops caudally and improve operative vision; a broad holding strap was routinely placed across the patient's thighs to prevent slippage off the bed during the operation. A 30° camera was used as required. A 10-mm epigastric port and two 5-mm right abdominal ports are placed under vision for instrumentation. The gallbladder fundus is retracted cephaladly and dissection using diathermy is started in the Calot's triangle to expose the cystic artery and the cystic duct. An intra-operative cholangiogram was performed at the surgeons' discretion. The cystic duct and artery is then divided between clips, and the gallbladder dissected off the liver in a retrograde fashion. The gallbladder is then removed through either the umbilical or the epigastric port in an endoscopic retrieval bag. The umbilical fascia and skin is closed with suture; the surgical incisions infiltrated with local anaesthesia. The patients are charted for regular analgesia (paracetamol, NSAIDs, opioids) and anti-emetics (metoclopramide, ondansetron). Patients undergoing LC at the authors' institution were generally admitted for an overnight stay, until the implementation of an ambulatory surgery protocol in mid-2011.

The exclusion criteria for this study included: acute cholecystitis, gallbladder neoplasm, open cholecystectomy and a combined procedure, e.g. repair of an inguinal hernia in conjunction with a LC.

Statistical analysis

Continuous outcomes (LOS and DOS) were tested using ANOVA, whereas categorical outcomes (open conversion, intra- and post-operative complications, and bile duct injuries) were tested using Fisher's exact test. To test for differences in LOS (days) between BMI groups, LOS (days) was transformed by raising to the power of −0.4 owing to non-normality of the residuals in the model using raw data: los_transformed = los−0.4. An ANOVA was then fitted to the data with transformed LOS as the outcome and BMI group as the independent variable. Logistic regression models were used to calculate the odds ratio to compare BMI groups for open conversion, intra- and post-operative complication and bile duct injuries. A $P < 0.05$ was considered a statistically significant result.

Results

A total of 799 consecutive patients who underwent elective LC between July 2010 and Sept 2013 were included in this study. The patient demographics and BMI data are shown in Table 1. An intra-operative cholangiogram was performed in 661 patients (83%) with no significant differences between the various BMI groups.

The overall median duration of surgery was 70 min [interquartile range (IQR) 56–91], with the procedure taking progressively longer to perform as the BMI increases (Table 2). Peri-operative outcomes by BMI group are shown in Table 2.

There were four (0.5%) patients who required conversion to open surgery. Three of the open conversions were as a result of dense adhesions precluding safe laparoscopic surgery, and

Table 1 Patient demographics

	BMI <26, *n* = 170	BMI 26–40, *n* = 553	BMI >40, *n* = 76	Total, *N* = 799
Female, *n* (%)	131 (77)	412 (74.5)	65 (85.5)	608 (76.1)
Mean age, year (SD)	46.8 (19.8)	46.7 (15.6)	40.6 (13.1)	46 (16.4)
Mean BMI (SD)	22 (2.4)	32 (4.0)	46 (5.0)	31 (7.2)

BMI, body mass index.