

Outcomes of laparoscopic cholecystectomy in obese patients at a Tertiary Care Hospital

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ABSTRACT

Background: Obesity is related to worse surgical outcomes following cholecystectomy as compared to individuals with normal body mass index (BMI). This study aimed to determine the outcomes of laparoscopic cholecystectomy in obese patients at a tertiary care hospital.

Methods: Descriptive case series conducted in the Department of General Surgery, over a period of six months. A total of 139 patients aged 18-60 years with a body-mass index greater than 27.5 kg/m² (Asian criteria for obesity) undergoing laparoscopic cholecystectomy were enrolled through consecutive, non-probability sampling. Operative duration, hospital stay, and postoperative pain (visual analogue scale, VAS) at 1 and 5 hours were recorded. Data were analyzed using SPSS version 22; the chi-square test or independent sample t-test was applied as appropriate, with $p < 0.05$ considered significant.

Results: The mean age was 43.34 ± 9.24 years and mean BMI was 32.73 ± 2.84 kg/m², with 68 males (48.9%) and 71 females (51.1%). Comorbid diabetes and hypertension were present in 16.5% and 14.4% of patients, respectively. The mean VAS score fell from 5.92 ± 1.02 at 1 hour to 3.30 ± 0.59 at 5 hours postoperatively. On multinomial regression, a higher BMI category was the only independent predictor of severe pain at 1 hour (OR 2.70, 95% CI 1.18–6.19, $p = 0.019$), while no variable significantly predicted pain severity at 5 hours.

Conclusion: Laparoscopic cholecystectomy is a feasible and effective option in obese patients too, with acceptable operative and pain outcomes. Higher BMI predicts greater early postoperative pain but this resolves by 5 hours with standard analgesia.

Keywords: Body Mass Index, Laparoscopic cholecystectomy, Obesity, Postoperative Pain, Visual Analogue Scale

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Introduction

Laparoscopic cholecystectomy (LC) is the preferred approach for symptomatic gallstone disease, but a substantial subset of cases proves technically demanding, a scenario termed difficult laparoscopic

cholecystectomy (DLC) (1). A systematic review of thirty studies totaling over 100,000 patients reported conversion to an open approach in roughly 6% of cases overall, ranging from 2.5% to 50%, with advanced age, male sex, prior abdominal surgery, diabetes, and obesity identified as consistent predictors of a difficult or converted procedure (2). Disease-related factors such as gangrenous change, acute cholecystitis, and dense pericholecystic adhesions make it more ambiguous the anatomy of Calot's

triangle and complex this risk (3). The worldwide increase in obesity has duplicated an increasing burden of gallstone disease. Extra visceral and abdominal wall adiposity tightens the operative field and limits instrument maneuverability, prolonging operative time and increasing technical difficulty (4, 5). A large administrative-database analysis of nearly 90,000 patients undergoing LC for acute cholecystitis found that class III (severe) obesity was independently associated with a higher rate of conversion to open surgery, with greater hospitalization cost and length of stay (6). Obesity has also association with a distinct postoperative risk profile, that increases the rates of surgical site infection, wound complications, respiratory compromise, and thromboembolic events, leading to prolong hospital stays in comparison to normal-weight patients (7). A large single-institution series found that operative difficulty, morbidity, and mortality after LC were not significantly related to body-mass index once surgery was performed by an experienced team (8), and recent audits of morbidly obese patients have similarly reported acceptable complication rates, arguing against routine use of a BMI cut-off to exclude patients from a minimally invasive approach (9). That's why Obesity should not be considered as a contraindication to LC, though it warrants careful preoperative planning and, where necessary, adjunctive techniques such as subtotal cholecystectomy or a fundus-first dissection. Local studies are limited: a Pakistani cohort undergoing LC reported a wound infection rate of about 10% in obese versus 2% in normal-weight patients, a longer mean hospital stay (4.5 ± 1.2 versus 3.2 ± 0.8 days), and a longer mean operative time (75 ± 20 versus 60 ± 15 minutes) (10-12).

Given this heterogeneity and the scarcity of setting-specific data, this study was designed to determine the outcomes of laparoscopic cholecystectomy, in terms of operative duration, hospital stay, and pain score, among obese patients at a tertiary care hospital.

Methods

This descriptive case series was conducted in the Department of General Surgery, over a period of six months following approval of the study synopsis by the hospital's ethics review committee letter (IRB/06/2026/01).

A total of 139 patients were enrolled through consecutive, non-probability sampling. The sample size was calculated using Epi Info software (Centers for Disease Control and Prevention), taking the anticipated frequency of wound infection following laparoscopic cholecystectomy in obese patients as 10% with a 95% confidence interval and a 5% margin of error.

Male and female patients aged 18 to 60 years with a body-mass index greater than 27.5 kg/m^2 (Asian criteria for obesity) who were scheduled to undergo laparoscopic cholecystectomy were included in the study. Patients with a previous history of abdominal surgery, obstructive jaundice, common bile duct (CBD) calculus, or a dilated CBD requiring CBD exploration, as well as patients unwilling to participate, were excluded on the basis of history and available medical records.

Laparoscopic cholecystectomy was defined as removal of the gallbladder using laparoscopic equipment after creation of pneumoperitoneum. Obesity was defined as a BMI greater than 27.5 kg/m^2 according to Asian criteria (13).

Outcome was assessed in terms of the mean duration of surgery (time from skin incision to skin closure, in minutes), mean hospital stay (calculated from the date of surgery to discharge, with discharge criteria being adequate pain control, mobilization out of bed, and tolerance of oral intake), and mean pain score, assessed using the visual analogue scale (VAS).

Following approval of the research protocol by the hospital ethics committee, patients undergoing laparoscopic cholecystectomy for acute cholecystitis at the Department of General and Emergency Surgery, Doctors Hospital, Lahore, and meeting the selection criteria were enrolled after obtaining informed consent from the patient or an accompanying guardian. Demographic information, including age and gender, was recorded on a predesigned proforma. All procedures were performed by the same experienced surgical team in order to standardize surgical performance across the study population.

Each patient was placed under general anesthesia in the supine position. Pneumoperitoneum was established using an open or closed technique, and a standard four-port laparoscopic approach was adopted. The cystic duct and cystic artery were identified, dissected, clipped, and divided, following which the gallbladder was dissected from the liver bed and extracted through the umbilical port. Hemostasis was secured, port sites were closed with absorbable sutures, and the excised gallbladder was sent for histopathological examination. Estimated intraoperative blood loss was recorded, and each patient was subsequently transferred to the recovery area in a stable

condition. Operative duration, length of hospital stays, and postoperative pain score were then recorded for every patient as per the operational definitions above.

Collected data were entered and analyzed using SPSS version 22. Frequencies and percentages were computed for categorical variables, including age group, gender, and the occurrence of surgical site infection, while means and standard deviations were calculated for continuous variables, including age, BMI, hospital stay, duration of surgery, and pain score. Effect modifiers such as age, gender, BMI, diabetes, and hypertension were controlled through stratification, linear and multinomial regression models were applied to assess the influence of these confounders on the outcome variables. A p-value of less than 0.05 was considered statistically significant.

Results

A total of 139 patients were included in the study. The mean age was 43.34 ± 9.24 years and the mean BMI was 32.73 ± 2.84 kg/m². There was an almost equal gender distribution with 68 males (48.9%) and 71 females (51.1%). Comorbidities and Presentation. The majority of patients did not have fever (89.9%), tachycardia (90.6%), or a previous history of colic (96.4%). Comorbidities included DM in 16.5% and HTN in 14.4% of patients. Elevated WBC >10 was present in 18.7%. Most patients presented with symptoms for >72 hours (84.9%).

Intraoperatively, D/C gallbladder was noted in 18.7%, impacted stones in Hartmann's pouch in 19.4%, GB adhesion >50% in 9.4%, and GB adhesion <50% in 18.7%. The mean VAS score at 1 hour was 5.92 ± 1.02 , which decreased to 3.30 ± 0.59

at 5 hours postoperatively. All the details are summarized in table 1.

Figure 1 illustrates the distribution of VAS pain categories at 1 hour and 5 hours postoperatively. At 1 hour, the majority of patients experienced moderate pain (n = 90, 64.7%), followed by severe pain (n = 49, 35.3%). No patients reported mild pain at this time point. By 5 hours, there was a marked reduction in pain severity. Mild pain became the predominant category (n = 95, 68.3%), with moderate pain reported by 44 patients (31.7%). No patients had severe pain at 5 hours.

Table 1: descriptive of study parameters

Variables	Mean/ Frequency	SD/ Percentages
Age (years)	43.34	9.24
BMI (kg/m ²)	32.73	2.84
VAS at 1 hour	5.92	1.02
VAS at 5 hours	3.30	0.59
Gender (M/F)	68/71	48.9/51.1
Previous history of colic (no/yes)	5/134	3.6/96.4
Symptoms >72 hrs (no/yes)	118/21	84.9/15.1
Fever (no/yes)	125/14	89.9/10.1
Tachycardia (no/yes)	126/13	90.6/9.4
WBC>10 (no/yes)	113/26	81.3/18.7
DM (no/yes)	116/23	83.5/16.5
HTN (no/yes)	119/20	85.6/14.4
D/C gallbladder (no/yes)	113/26	81.3/18.7
Impacted stones in Hartmann's pouch (no/yes)	112/27	80.6/19.4
GB adhesion >50% (no/yes)	126/13	90.6/9.4
GB adhesion <50% (no/yes)	113/26	81.3/18.7

BMI; body mass index, WBC; white blood cells, CRP; C-reactive protein, DM; diabetes mellitus, HTN; hypertension, D/C; distended or contracted, GB; gall bladder, VAS; visual analogue scale

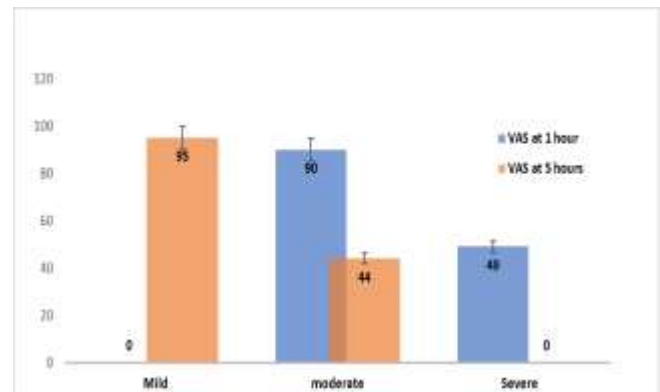


Figure 1: Frequency of pain at 1 hour and 5 hours

Multinomial logistic regression was performed to identify independent predictors of postoperative pain severity at 1 hour and 5 hours. At 1 hour postoperatively, with "Moderate" VAS as the reference category, BMI category was the only statistically significant independent predictor of "Severe" pain. Patients in a higher BMI category had 2.70 times higher odds of experiencing severe pain compared to moderate pain at 1 hour (OR = 2.703, 95% CI: 1.181–6.186, $p = 0.019$). Age category demonstrated a trend toward significance for severe pain (OR = 2.310, 95% CI: 0.931–5.735, $p = 0.071$). WBC also showed a non-significant trend (OR = 4.446, $p = 0.103$). Gender, previous history of colic, symptom duration, fever, tachycardia, CRP, DM, HTN, and impacted stones in Hartmann's pouch were not significantly associated with severe vs moderate pain at 1 hour. At 5 hours postoperatively, with "Mild" VAS as the reference category, no variables were statistically significant predictors of "Moderate" pain. WBC showed the strongest trend toward association with moderate pain (OR = 4.514, 95% CI: 0.745–27.352, $p = 0.101$), followed by fever (OR = 2.634, $p = 0.413$). Other factors including age, BMI, gender, previous history of colic, and comorbidities were not significantly

associated. Overall, higher BMI was independently associated with severe early postoperative pain at 1 hour. At 5 hours, pain severity was not significantly predicted

by any of the clinical or demographic variables assessed, although inflammatory markers showed non-significant trends.

Table 2: Impact of study variables on Vas at 1 hour and 5 hours

Variables	VAS at 1 hour		VAS at 5 hours	
	P-value	OR (95%CI)	p-value	OR (95%CI)
Age	0.07	2.31 (0.93-5.73)	0.43	1.44 (0.57-3.61)
Gender	0.91	0.95 (0.44-2.07)	0.72	0.86 (0.39-1.86)
BMI	0.01	2.7 (1.18-6.18)	0.47	1.33 (0.60-2.93)
Previous history of colic	0.81	0.77 (0.08-6.99)	0.77	0.74 (0.09-5.66)
Symptoms duration	0.72	0.76 (0.18-3.26)	0.75	1.25 (0.29-5.32)
Fever	0.75	0.71 (0.08-5.81)	0.41	2.63 (0.25-26.8)
Tachycardia	0.72	1.4 (0.17-12.0)	0.82	0.76 (0.07-7.67)
WBC	0.10	4.4 (0.74-26.7)	0.10	4.5 (0.74-27.3)
CRP	0.69	1.2 (0.38-4.24)	0.27	0.46 (0.12-1.81)
DM	0.31	0.51 (0.14-1.84)	0.20	0.41 (0.11-1.59)
HTN	0.47	0.16-1.84)	0.83	0.87 (0.23-3.17)
Impacted stones in Hartmann's pouch	0.30	0.43 (0.08-2.1)	0.31	0.43 (0.08-2.17)

Multinomial regression model. BMI; body mass index, WBC; white blood cells, CRP; C-reactive protein, DM; diabetes mellitus, HTN; hypertension

Discussion

Our descriptive case series of 139 obese patients that underwent laparoscopic cholecystectomy had a mean age of 43.34 ± 9.24 years, while the mean BMI was 32.73 ± 2.84 kg/m². The gender distribution was nearly equal which shows that our findings are broadly reliable with other cohorts of obese patients undergoing cholecystectomy (14).

The most prevalent comorbidities were diabetes mellitus (16.5%) and hypertension (14.4%), which reflect the proper clustering of hypertensive, obesity and insulin resistant patients having gallstone disease (15). This metabolic overlap carries practical implications, as diabetes has independently been shown to increase gallstone risk and may complicate perioperative glycemic and wound management (16).

Postoperative pain declined markedly between 1 and 5 hours (VAS 5.92 ± 1.02 to 3.30 ± 0.59), and a higher BMI category independently predicted severe early pain (OR 2.70, 95% CI 1.18–6.19, $p = 0.019$). According to the literature such observations in other population has association with high early postoperative pain, that is possibly reflecting altered pain thresholds, adipose-tissue inflammatory mediators, and increased mechanical traction on the abdominal wall during surgery (17, 18). In our study notably, at 5 hours there was no clinical or demographic variable was found a significant predictor, suggesting that the effect of adiposity on pain is greatest in the instant postoperative period and reduces as multimodal analgesia takes effect (19, 20).

The intraoperative findings were noticeable such as impacted stones in Hartmann's

pouch (19.4%) and gallbladder adhesions (9.4–18.7%) reflect the anatomical distortion that excess adiposity and chronic inflammation impose on Calot's triangle, consistent with previously described predictors of a technically difficult procedure (21, 22). Despite of various challenges, no major intraoperative complications were noted in our series, that support the growing consensus that obesity, although technically demanding, does not prevent a safe laparoscopic outcome.

Limitations

It was only a single-center study rather than multiple centers, with no control group. The findings cannot create connection and may have limited generalizability to other settings. The follow-up period was also short. Larger, multicentric comparative studies with longer follow-up are recommended to validate these findings.

Conclusion

Laparoscopic cholecystectomy remains a feasible and effective treatment for obese patients too. Higher BMI predicts greater early postoperative pain but this resolves by 5 hours with standard analgesia. Obesity should therefore not be regarded as a contraindication to a minimally invasive approach, provided that perioperative pain control and comorbidity management are tailored to this higher-risk group.

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All the authors agree to take responsibility for every facet of the work, making sure that any concerns about its integrity or veracity are thoroughly examined and addressed.	