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DIFFICULTIES AND COMPLICATIONS IN LAPAROSCOPIC CHOLECYSTECTOMY IN OBESE AND NON-OBESE PATIENTS: A COMPARATIVE STUDY

General Surgery

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ABSTRACT

Introduction: Obesity is currently a worldwide lifestyle disease and is considered one of the contributing factors to cholelithiasis. For patients having symptoms of gallstone disease, in the case of acute or chronic cholecystitis and for obese people, laparoscopic cholecystectomy is considered as gold standard management. Reasons for higher conversion rate in the obese population undergoing laparoscopic cholecystectomy include difficulty in cannula insertion, obscured anatomy of Calot's triangle because of excessive intraperitoneal fat, inadequate space to retract the liver, and difficulty with instrument handling in an excessively thick abdominal wall. **Methodology:** This prospective observational study was conducted on fifty patients (25 patients in each group) with prior written and informed consent. Patients aged above 18 years presenting with cholelithiasis were included in this study, over a period of 18 months. Laparoscopic cholecystectomy was done in all patients by an experienced laparoscopic surgeon. Patients were allocated into two groups based on BMI (body mass index) which was calculated using the Quetelet Index. Difficulties and complications were compared between two groups in intraoperative and postoperative period. **Results:** Intraoperatively, obese patients were more likely to have impacted stones in hartmann's pouch (36% vs 20%, p<0.007), when compared to non-obese patients. There is a significant difference in difficulty in creating pneumoperitoneum between non-obese vs obese patients (0% vs 8%; p<0.049). A comparison of the rest of the intraoperative and postoperative findings was insignificant between the two groups. Postoperatively, none of the findings were significant between the two groups in terms of postoperative stay, average pain score, and surgical site infection. **Conclusion:** This study has shown that laparoscopic cholecystectomy can be performed safely in the obese patients and with favourable outcomes as seen in those patients with a normal body-mass index.

KEYWORDS

INTRODUCTION

Gallstones are the most common biliary pathology and chole cystectomy is one of the most common procedures done by general surgeons. Of all, less than 2% of subjects show symptoms of gallstone diseases and will ultimately require cholecystectomy.[1] For patients having symptoms of gallstone disease, in the case of acute or chronic cholecystitis, after recent acute pancreatitis, in elderly patients with co-morbidity, and for obese people, laparoscopic chole cystectomy is considered as gold standard management.[2,3]

Obesity is currently a worldwide lifestyle disease and is considered one of the contributing factors to cholelithiasis.[4] Cholesterol stones are the most common gallstone type found in the obese population.[5] The formation of cholesterol stones in obesity is multi-factorial and is primarily related to metabolic abnormalities associated with cholesterol hypersecretion by the liver. Gallstone formation is also accelerated by rapid weight loss following a very low-calorie diet or after bariatric surgery.[5,6] Given these associations, obese individuals are more likely to have symptomatic gallstone disease requiring surgical management.[6,7]

Many studies have shown the effectiveness, safety, and cost-effectiveness of laparoscopic cholecystectomy. Laparoscopic chole cystectomy is associated with a morbidity rate of 5-10%, a mortality rate of 0.1% and the conversion rate from laparoscopic to open cholecystectomy is 5-10%. The outcome would be greatly influenced by surgeon-specific factors, such as, training, experience, skill, and judgment. In addition, numerous patient and disease-related factors, such as male gender, obesity, old age (>65yr), prior abdominal surgery, and anomalous anatomy are significant risk factors for conversion to the open procedure.[2,3]

Reasons for higher conversion rate in the obese population undergoing laparoscopic cholecystectomy include difficulty in cannula insertion, obscured anatomy of Calot's triangle because of excessive intraperitoneal fat, inadequate space to retract the liver, and difficulty with instrument handling in an excessively thick abdominal wall.[8] Limitations in penetration and anaesthetic issues are common difficulties in obese patients undergoing laparoscopic surgery.[9] Excessive bleeding during dissection, the fragility of tissues, or any fear of injury owing to the inability to see clearly should guide the surgeon toward a decision for conversion. Pilot studies revealed that advanced age, a history of cardiovascular disease, gangrenous gallbladder, and an elevated leukocyte are important risk factors for conversion.

Overall, laparoscopic cholecystectomy has a low rate of complications, low rate of conversion, and low incidence of mortality and morbidity in experienced hands.[10,11] There is a paucity of literature in the Indian setup to assess difficulties and complications in laparoscopic cholecystectomy in obese patients. Hence, we considered this study in our institution.

MATERIALS AND METHODS

This prospective observational study was conducted in the Department of Surgery, at SGT Medical College and Hospital, Gurugram, Haryana after obtaining approval from the Institutional Ethical Committee and written informed consent from fifty patients (25 patients in each group). Patients aged above 18 years presenting with cholelithiasis were included in this study, over a period of 18 months. Laparoscopic cholecystectomy was done in all patients by an experienced laparoscopic surgeon. Patients were allocated into two groups based on BMI (body mass index) which was calculated using the Quetelet Index i.e., body weight (in kilograms) divided by height squared (in meters) with the cut-off limit of 30 kg/m^2[27]. Patients were divided into two groups – nonobese vs obese. All patients more than 18 years of age with symptomatic cholelithiasis consented to laparoscopic cholecystectomy while patients with obstructive jaundice, common bile duct stone, suspected malignant gallbladder disease,previous upper abdominal surgery, acute cholecystitis, and pregnant and

lactating females.All patients underwent pre-operative scanning including demographic details, detailed history, and basic pre-anaesthetic check-up. Informed consent for surgery as well as consent for conversion from laparoscopic to open surgery was obtained.During the procedure,acareful note was made for difficulty in creating pneumoperitoneum, grasping GB, retracting GB, anatomical variation of calot's triangle, adhesions, and embedded gallbladder in the liver. Intra-operative difficulties such as gall bladder perforation, spillage of bile, spillage of stone, retrieval of stones completely or loss of stones in the peritoneal cavity/abdominal fat, difficulty in extraction of the gallbladder, and spillage of stones and bile during extraction of the gall bladder or any conversion to standard open cholecystectomy and its reasons were noted.

Statistical methods:

Descriptive statistics were analyzed with SPSS version 26.0 software, continuous variables were presented as mean +/- SD. Categorical variables were expressed as frequencies and percentages. The parametric data was analyzed by Student's t-test for unpaired samples and non-parametric data was analyzed using the Chi-square test or Fisher's-exact test. A p-value of < 0.05 was taken as statistically significant. Sampling was done using a snowball sampling technique and a convenient sampling technique was used. During the duration of the study, a minimum of 25 cases were taken in each group.

Observations

A total of 50 patients were included in the study. The mean age of the patients was 40.88 years with a maximum number of patients in the 30-40 years of age group. 84% of included patients were females and the rest 16% were males. Maximum patients (64%) in the non-obese group were in the BMI range of 18.5-22.9 Kg/m^2 while the patients in the obese group were in the BMI range of 30-34.9 Kg/m^2 and it varied significantly between the two groups ($p < 0.001$). Co-morbidities were almost equally distributed among both groups affecting 30% of total patients. It varied significantly between the groups ($p < 0.044$).

Table 1: Demographic variables between non-obese and obese groups

PARAMETERS	NON OBESE	OBESE	p-value
Age (Years)	39.48 ± 13.73	42.28 ± 11.23	0.312
Gender			0.702
Male	5 (20.0%)	3 (12.0%)	
Female	20 (80.0%)	22 (88.0%)	
BMI (Kg/m^2)	21.77 ± 2.74	31.18 ± 0.86	<0.001
Co-Morbidity			0.044
None	17 (68.0%)	18 (72.0%)	
HTN	2 (8.0%)	2 (8.0%)	
PTB	4 (16.0%)	0 (0.0%)	
Hypothyroid	0 (0.0%)	3 (12.0%)	
DM	2 (8.0%)	0 (0.0%)	
HUN	0 (0.0%)	1 (4.0%)	
UTI	0 (0.0%)	1 (4.0%)	

In the present study, intraoperatively, obese patients were more likely to have impacted stones in hartmann's pouch (36% vs 20%, p<0.007), when compared to non-obese patients. There is a significant difference in difficulty in creating pneumoperitoneum between non-obese vs obese patients (0% vs 8%; p<0.049). A comparison of the rest of the intraoperative and postoperative findings was insignificant between the two groups and is tabulated below.

Postoperatively, none of the findings were significant between the two groups in terms of postoperative stay, average pain score, and surgical site infection.

Table 2: Intraoperative and postoperative variables between non-obese and obese groups.

CHARACTERISTIC	NON-OBESE	OBESE	p-value
Intraoperative findings			
Impacted stones	5 (20%)	9 (36%)	0.007
Difficulty in creation of pneumoperitoneum	0(0%)	2 (8%)	0.049
GB retraction	9 (36%)	8 (32%)	0.765
Obliterative anatomy of calot's triangle	16 (64%)	19 (76%)	0.355
Operative time	86.60 ± 22.53	101.60 ± 38.64	0.255
Anatomical variation of calot's triangle	4 (16%)	2 (8%)	0.667
Conversion to open cholecystectomy	1 (4%)	2 (8%)	1.000
Drain placement	11 (44%)	12 (48%)	0.777
Post-operative findings			
Average pain score	1.28 ± 1.40	1.20 ± 1.53	0.748
Surgical site infection (7 days)	1 (4.0%)	1 (4.0%)	1.00
Hospital stay	2.00±0.82	2.44 ± 1.08	0.230

DISCUSSION

Laparoscopic cholecystectomy has been established as the gold-standard treatment for symptomatic cholelithiasis. Numerous large series have 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.[2,3] One of the risk factors for cholelithiasis is obesity, the incidence of which is increasing worldwide.[4,13] Therefore, surgeons are likely to encounter more obese patients who require a cholecystectomy for symptomatic cholelithiasis. Traditionally, obesity has been considered a relative contraindication to laparoscopic cholecystectomy, as the technical difficulties associated with this procedure in obese patients were thought to be associated with higher morbidity and mortality as well as an increased conversion to open surgeries.[8] However, with increasing experience in laparoscopic surgery and the development of better instruments, the practice of laparoscopic cholecystectomy in obese patients is advancing. Several recent studies have reported that laparoscopic cholecystectomy is practically feasible and can be safely performed in obese patients.[14-16] This was a prospective study to compare cases of laparoscopic cholecystectomy in normal and obese patients in relation to operative time, difficulty in creating pneumoperitoneum, conversion rate to open cholecystectomy and post-operative complications.

The results of this study compare favourably with other figures published in the literature in terms of the intraoperative finding of impacted stone at Hartmann's pouch or neck of the gall bladder. Studies by Lal P et al and Sugrue et al also mentioned similar findings with stone impaction at the gallbladder neck and were found to have a difficult laparoscopic procedure.[17,18]Also, conversion to open surgery was found significantly associated with this finding. All these studies showed that, the main difficulty with stone impacted at the neck or Hartmann's pouch is that, it hinders holding of the gallbladder during dissection. Due to the impacted stone, the gallbladder is distended with mucus forming the mucocele of the gallbladder, which is even more difficult to hold. This increases the chances of conversion of laparoscopic procedures to open surgery.[17,18]

Interestingly, in the present study, the operating surgeon encountered difficulty in creating pneumoperitoneum in the obese group. This difference was found statistically significant (p-value< 0.0490).A study done by Pasic R et al andMcllwaine et al also reported similar difficulty owing to the increased abdominal wall thickness and extraperitoneal fat posing a challenge to safe peritoneal entry and failure to establish pneumoperitoneum may lead to higher conversion rates.[19,20] Suboptimal access techniques also make maintaining the pneumoperitoneum a challenge.[21-23] Insertion at carefully selected positions and in the direction of the cannulas' intended use can overcome the challenges of abdominal wall thickness, ensuring port stability during the maneuvering and exchange of instruments.

Difficult gall bladder retractionwas equally seen in both groups which is contrary to the findings of Kama et al, Rosen et al and Pavlidis TE.[10,22,23]The gallbladder fundus cannot be adequately retracted caudally due to the stiff, steatotic liver, while significant reverse Trendelenburg position and table tilt may not be tolerated. Thus, the duodenum, colon and excessive omentum can obscure the laparoscopic view which increases the operative time and increase the rates of conversion from laparoscopic to open cholecystectomies. The reason behind this contrary result might be due to the fact that all cholecystectomies were performed by an experienced consultant and with the latest training.

In the present study, during 35 (70%) laparoscopic cholecystectomies, there was obliterated anatomy of Calot's triangle due to dense omental/intestinal adhesions but no significant difference between the

groups. Contrary to our results, Simopoulos et al and Paajanen et al discussed the role of abdominal fat, obliterated anatomy in the cystic pedicle, large fatty livers, and a bulky and adherent transverse colon leading to dissection difficulties.[15,24]

Although the differences in operating time and conversion rate were not significant (p-value< 0.255; p-value< 0.355) respectively, there was a tendency for a longer operating time in the morbidly obese. Comparing the morbidly obese with non–morbidly obese patients, Nies et al reported comparable conversion rates (11.4% vs 15.5%), while Gliattli et alfound no difference in operating time (median, 110 mins in both groups).[25,26]

In the present study, the mean hospital stay after cholecystectomy was 2 days in the non-obese group and 2.44 days in the obese group, with no significant difference between the two groups (p-value 0.23). Similar insignificant results were reported by Simpolous C et al(p-value - 0.861), by Schirmer BD et al and by Obuchi T et al.[15,27,28]

In conclusion, laparoscopic cholecystectomy in obese patients is safe, but it may be associated with difficulty in creating pneumoperitoneum and grasping the gallbladder fundus. It is associated with increased operating time, morbidity, intraoperative complications, postoperative complications, or conversion rate. However, the differences were not statistically significant. If suitable equipment and expert surgeons are available, symptomatic patients should be offered the benefits of laparoscopic cholecystectomy regardless of body mass.

CONCLUSION

This study has shown that laparoscopic cholecystectomy can be performed safely in the obese patients and with favourable outcomes as seen in those patients with a normal body-mass index.

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