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## Study of risk factors for conversion during laparoscopic cholecystectomy in a tertiary care teaching hospital

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### Abstract

Laparoscopic cholecystectomy has become the standard treatment for symptomatic gall bladder disease. However, there still a substantial proportion of patients in whom Laparoscopic cholecystectomy cannot be successfully performed, and for whom conversion to open surgery is required. This was a longitudinal study conducted in surgical unit of Sri Siddhartha Medical College. All the patients who had right hypochondriac pain and diagnosed with cholelithiasis on USG were included in the study. From the data collected, only factors available to surgeon preoperatively were considered for analysis. These factors included: age, gender, history of acute Cholecystitis, obesity and concomitant disease, In our study 90 patients were underwent laparoscopic cholecystectomy Out of 90 total patients included in the study 81 patients had underwent successful Laparoscopic cholecystectomy and 9 patients needed conversion to open cholecystectomy. The conversion rate is 10% which is consistent with the other studies. The most common reason for conversion was difficult to define anatomy in patients with inflamed, contracted gall bladder. Significant predictor factors for conversion were male gender, acute Cholecystitis, and obesity. In our study it is concluded that Male sex, Age >50yrs, obesity (BMI>35 kg/m<sup>2</sup>), and cholecystitis are considered risk factors for conversion of Laparoscopic cholecystectomy to Open cholecystectomy. These factors can predict difficulty to be encountered during surgery and help in making a decision for conversion thus shortening the duration of surgery and preventing unnecessary complications.

**Keywords:** gall bladder, cholelithiasis, laparoscopy cholecystectomy, open surgery

### Introduction

Gastro-intestinal surgery has undergone a revolution in the recent years by the introduction of laparoscopic techniques. The concept of “keyhole surgery” created an immediate disparity between the potential of the new technique and training of surgeons to perform it. Now modern surgical methods are aimed at giving cure along with minimal invasive techniques with patient in mind, safety never being compromised. Cholelithiasis, which continues to be one of the most common digestive disorders encountered, was traditionally being dealt by conventional or open cholecystectomy. With the introduction of laparoscopic cholecystectomy, the surgical community witnessed a revolution in basic ideology and the importance of minimal access surgery has suddenly impacted. Ultrasound is the gold standard investigation for patients undergoing a cholecystectomy as it provides as sensitive approach for analyzing characteristics of gallbladder. Laparoscopic cholecystectomy (LC) stands for a gold standard for the treatment of gall stone disease [1]. The difficult gall bladder is the most common difficult laparoscopic surgery being performed by general surgeons all over the world and the potential one that places patient at significant risk. Laparoscopic cholecystectomy has revolutionized our approach to a number of problems and caused a reevaluation of clinical strategies. It is associated with minimal risk to the patient and a high degree of relief from symptoms. Now it has become the standard therapy for symptomatic gall stone disease, particularly in elective setting<sup>2</sup>. However, in the case of intra-abdominal adhesions, perforated gallbladder, atypical uncertain anatomy, or when intra-operative complications occur, it’s impossible to manage them laparoscopically, and the open method is still indicated [1, 2]. The factors leading to conversion may be patient related such as distorted anatomy, uncontrollable bleeding, trauma to bile duct or other viscera; surgeon related such as less experience of difficult situations and equipment related like instrument failure or power break down with back up failure. A conversion rate of 1.5 to 19% have been reported in different studies [3]. However the outcome of laparoscopic cholecystectomy is influenced greatly by the training, experience, skills and judgment of the surgeon [4].

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In our study, we have made an attempt to know the risk factors involved in conversion of laparoscopic cholecystectomy.

### Materials and Methods

This study was conducted at Sri Siddhartha Medical College Hospital, for a period of 2 years. All the patients who presented with cholelithiasis were included in the study. The patients having history of jaundice, common bile duct dilatation (>8mm in diameter on ultrasonography), choledocholithiasis and carcinoma gall bladder were excluded from the study. Data of all the patients were recorded, including past medical history, indications for operation, duration of operation, operative findings, and reasons for conversion and postoperative complications. Standard laparoscopic cholecystectomy was performed with four ports and Hassan's open technique. Calot's triangle was visualized and dissection was carried out by means of electro cautery and Adhesions of gall bladder were separated by blunt, sharp and hydro-dissection as well as with the help of suction cannula and gauze piece. Distended gall bladder (especially mucocele and empyema) were decompressed by suction and aspiration, cystic duct and artery skeletonized, clipped and divided. A sub costal muscle transection incision was used for open cholecystectomy; the length of the incision was tailored to the individual patient and kept to the minimum necessary to allow safe and adequate access to the gall bladder. Dissection was started at Calot's triangle and proceeded antegradely towards the fundus, Fundus first method and subtotal cholecystectomy at callot's triangle in patients with unclear callot's anatomy. Drains were kept selectively in

difficult cases with the risk of postoperative bleeding or biliary leakage. Prophylactic antibiotics (2nd or 3rd generation cephalosporin) were used for initial two days. Details of patients who underwent conversion to open operation were analyzed and the factors responsible were noted.

### Results

Out of total 90 patients included in the study 81 patients had undergone successful Laparoscopic cholecystectomy and 9 patients needed conversion to open cholecystectomy. The conversion rate is 10% which is consistent with the other studies. Four out of seventy two patients whose age was below 50 years had undergone conversion and rest had undergone successful Laparoscopic cholecystectomy. Five out of eighteen patients whose age was above 50 years had undergone conversion and the rest had undergone successful laparoscopic cholecystectomy. Six out of thirty five male patients had undergone conversion and the rest had successful laparoscopic cholecystectomy. Three out of fifty five female patients had undergone conversion. Three out of five obese patients have undergone conversion while six out of eighty five non-obese patients had undergone conversion Three out of seventeen patients with characteristics of cholecystitis underwent conversion while six out of seventy three patients without cholecystitis underwent conversion. Factors associated with conversion to open cholecystectomy are presented in Table 1. While significant predictors of conversion to open cholecystectomy were: age more than 50 years, male gender, obesity, and acute Cholecystitis,

**Table 1:** Relationship between clinical characteristics and risk factors for conversion

Variables		Total n=90	LC-OC n=9(%)	P value
Age	<50 years	72	4 (5.6%)	0.014
	>50 years	18	5 (27.8%)	
Sex	Male	35	6 (17.1%)	0.076
	Female	55	3 (5.5%)	
Obesity	Non obese	85	6 (7.1%)	0.006
	Obese	5	3 (60.0%)	
Cholecystitis	With cholecystitis	17	3(17.6%)	0.225
	Without cholecystitis	73	6 (8.2%)	

N: Total number of cases

LC –OC: Laparoscopic cholecystectomy to open cholecystectomy

### Discussion

Traditional cholecystectomy is an integral part of every surgical training programme and is performed by most general surgeons. The advent of laparoscopic cholecystectomy has created an excitement and a flurry of activity in the medical community. A study carried out at Georgia between 1989 and 1991 by the Georgia Baptist Medical Center, with the conversion rate which is 2.3%, then dense adhesion was the main cause for conversions and they consider dense adhesions as a technical cause. The

study from Texas has reported a conversion rate was 5% and they consider male sex, severe obesity and acute cholecystitis as the major risk factors for conversion [5]. Present study showed that the conversion rate of laparoscopic cholecystectomy is 10% which is similar with various national and international studies. In most of the recent studies reported conversion rates vary between 1.5–19% which is almost similar to the other studies reported earlier [6-10]. The operating time was more when the patients were male sex, obese, and calculous cholecystitis.

**Table 2:** Comparison of Rate of Conversion with other studies

Studies	Total no of cases (n=)	LC – OC Conversion	%
H. J. J. van der steeg <i>et al</i> 2011 [6]	972	121	12%
Basim Jasim Abdul Hussein <i>et al</i> 2015 [7]	1600	56	6%
Tariq Rashid, <i>et al</i> 2016 [8]	300	21	7%
Sujoy Mukherjee <i>et al</i> 2018 [9]	505	37	7.3%
Digvijoy Sharma <i>et al</i> 2018 [10]	498	48	8.8%
Present study	90	9	10%

The decision about when to convert to laparotomy is an individual one, often subjective, made by the surgeon in the course of the procedure. In our study, the main reason for

conversion was inability to define the anatomy clearly, this finding was noted in similar studies [11-13]. In our study, there were no major complications and some minor complications like

wound infection in nine cases and port site hernia in three cases. There was no peri-operative mortality and no CBD injury. Among 90 patients included in the study who were admitted for laparoscopic cholecystectomy. 9 (10%) had undergone conversion. Seventy two (80%) patients were above 50 years and Eighteen (20%) were below 50 years of age. Rate of conversion was high in patients who were above 50 years (27.8%) compared to that of patients below 50 years (5.6%). P-value was 0.014 which was 0.076 which is statistically not significant. Fifty five (61.11%) patients were females and thirty five (38.88%) were males, with an average age of 41.91 years (range 23 to 80 years). Rate of conversion was high in males (17.1%) compared to females (5.5%) as males have narrow coastal angle which makes dissection difficult. P value was which is not significant. The BMI ranged from 16.7 to 41.4 kg/m<sup>2</sup>, 5 (5.55%) patients were considered obese whose BMI was more than 35. Rate of conversion was more in obese (60%) patients compared to that of non-obese (7.1%) Explanations for the higher conversion rate in obese patients include difficult Trocar placement, obscure anatomy because of excessive intra peritoneal fat, and inability to retract the liver sufficiently and even because of thick abdominal wall and distant operative site from the wall which makes the surgeon feel difficult and strain his hands. P value was 0.06 which is statistically not significant. Access to peritoneal cavity was difficult in 4 obese cases due to thick abdominal wall. Seventeen patients were diagnosed with cholecystitis in which acute were 9 (52.9%) and chronic were 7 (47.05%). Rate of conversion was high in patients with cholecystitis (17.6%) when compared to that of patients without cholecystitis (8.2%) due to difficulty in identifying anatomy during dissection because of oedematous gall bladder and inflamed Calot's triangle in acute cholecystitis, scarred and fibrosed gall bladder in chronic cholecystitis. Acute cholecystitis is accompanied by increased vascularity and dense adhesions that interfere with good visualization, whereas thick walled gall bladder often is shrunken and contracted. In both presentations the cystic duct becomes foreshortened, and the gall bladder may be adherent to the common bile duct, making it difficult to grasp the gall bladder for retraction or to dissect the gall bladder from the common bile duct. P-value was 0.225 which is statistically not significant. In this study the operative time ranges from 39 min to 162 min. prolonged operative time was observed in cases with thick walled GB, Male sex, and contracted GB.

### Conclusion

In the perspective of LC being the gold standard treatment of symptomatic cholelithiasis, pre-op prediction of risk of conversion is an important aspect in planning LC. Several studies have been published in the past years to assess the risk factors for difficult LC. The clinical profile of a patient can predict a difficult gall bladder surgery. With the advancement in equipment and gaining experiences in laparoscopy, most of the difficult gallbladder can be dealt laparoscopically. Conversion to open surgery is an indication of sound judgement of the surgeon in view of safety of the patient.

Age, obesity, Male sex, and cholecystitis are recognized risk factors of conversion. In our study it is concluded that Male sex, Age >50yrs, obesity (BMI>35 kg/m<sup>2</sup>), and cholecystitis are considered risk factors for conversion of Laparoscopic cholecystectomy to Open cholecystectomy. These factors can predict difficulty to be encountered during surgery and help in making a decision for conversion thus shortening the duration of surgery and preventing unnecessary complications.

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