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Observations on Factors for Conversion of Laparoscopic to Open Cholecystectomy

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Abstract **Original Research Article**

Introduction: Now a days Laparoscopic cholecystectomy has established itself as the surgical procedure of choice for most of the gall bladder diseases. But in certain circumstances it needs to be converted to open surgery because of various factors. Aim: To evaluate and analyse the factors and circumstances that necessitate conversion of laparoscopic cholecystectomy to open cholecystectomy while performing this minimal access procedure. ***Materials and Methods:*** A total of 488 laparoscopic cholecystectomies were attempted and completed in Peerless Hospital and B.K. Roy Research Center, Kolkata from September 2017 to August 2018. Out of these 24(4.92%) cases had to be converted to open cholecystectomy. Various factors leading to conversion were analysed. ***Result:*** About 4.92% of the total laparoscopic cholecystectomies required conversion. Male patients were found more prone for conversion (9.27%) as compared to females (2.04%). The commonest operative finding that led to conversion was adhesions in 16 out of 24 (66.66%). The cases that were converted were liable to have much higher chances of iatrogenic injuries to the common bile duct, bowel and more susceptible to post-operative infections. ***Conclusion:*** Male patient and operative findings of adhesions led to the highest incidence of conversion of laparoscopic to open cholecystectomy. Knowledge and suspicion of possibility based on preoperative assessment of these factors helps in better preoperative surgical planning and patient counseling.

Keywords: Adhesions, Cholelithiasis, Laparoscopic Colecystectomy (LC), Open holecystectomy (OC).

INTRODUCTION

The first successful cholecystectomy by open technique was done by Carl-Langenbuch in 1892 which remained the gold standard for the management of gall stones for about a century. In 1985 Eric Muhe performed the first successful laparoscopic cholecystecomy. Phillip Mouret further improved this procedure in 1987 .Now a days it has rapidly replaced open cholecystectomy (OC) as the standard treatment of symptomatic and even uncomplicated gallstone disease. Laparoscopic cholecystectomy has the advantage of shorter hospital stay, less post-operative pain, faster recovery, better cosmesis and lower cost as compared to open cholecystectomy. Despite all its advantages, sometimes the surgeon is confronted with situations that require convertion of laparoscopic cholecystectomy to open cholecystectomy for a safe and complication free outcome. Conversion rate ranging between 2.6-14% has been described in the literature. Many studies have identified different factors for such conversions. Most common factors being difficult dissection following adhesions in Calot's triangle, abnormal anatomy of GB and biliary tract, upper abdominal scarring due to previous abdominal surgery, obesity, duration of gallstone disease, number of attacks of cholecystitis, complications such as bleeding, equipment problems, comorbidities etc. Hence, every laparoscopic surgeon is required to understand the factors that may lead to conversion of laparoscopic cholecystectomy to open cholecystectomy. Difficult laparoscopic cholecystectomy can be predicted pre-operatively that may help in proper pre-operative planning and counselling to reduce overall complications and morbidity. While most of the previous studies in the literature were retrospective and evaluated various risk factors in terms of conversion to OC, our present study is a prospective study analyzing these risk factors as pre-operative predictors on clinical evaluation and ultrasonographic parameters and correlation of these predictors with operative findings and final surgical outcomes.

MATERIAL AND METHODS

A prospective study over one year duration including 488 patients was conducted on admitted patients of gallbladder disease, mostly cholecystitis with cholelithiasis in the department of Surgery at Peerless Hospital and B. K. Roy Research Center, Kolkata during the period from September 2017 to August 2018. This is a tertiary care corporate hospital which caters to middle and upper middle class of patients. Ethical clearance from ethical committee was taken for the study.Inclusion criteria were all patients diagnosed as cholelithiasis with acute or chronic cholecystitis, Mucocele, Empyema, cholesterosis and GB Polyps. Exclusion criteria included patients with common bile duct calculi, diagnosed gallbladder malignancy, severe cardio-pulmonary risk or any other anaesthetic risks. All patients underwent routine basic preoperative investigations like ultrasound of abdomen, chest X-ray,complete blood counts, random blood sugar, kidney function tests, liver function tests, electrocardiogram, Echocardiogram in selected cases ,routine urine examination and microscopy. All patients received third generation cephalosporin for antibiotic prophylaxis before induction of anaesthesia. Pneumoperitoneum was created using Veress needle. Surgery was done by 4 port technique. The first port (10 mm or 5mm depending upon used scope size) was inserted in the sub umbilical region. Epigastric port of 10 mm and rest two 5 mm ports were inserted along the midclavicular and right anterior axillary line. Conversions whenever done, were performed mostly by subcostal incision or sometimes midline incisions. Post surgery drain was placed in majority of patients on individual merits. An analysis of patient demographics, intraoperative factors, complications, reason for conversion and duration of hospital stay was performed.

RESULTS

A total of 488 patients were taken up for laparoscopic cholecystectomy during this period, 24 (4.91%) of which were converted to open cholecystectomy. Table-1 shows the age distribution in converted and non converted group of patients and also conversion rate in various age group. The mean age in both the groups were similar. No risk of conversion was associated with increasing age. Most patients 193 (38.2%) belonged to age group of 31-40 years and highest number of conversions 13 (2.5%) also took place in the same group.

Table-1:

Age Group (years)	Nonconverted group (LC) (n=464)	Converted group(LC to OC) (n=24)	Conversion Rate
Less than 20	9	-	-
20-30	128	4	3.13%
31-40	188	9	4.78%
41-50	68	4	5.88%
51-60	43	3	6.98%
61-70	22	3	13.63%
Above 70	6	1	16.66%
TOTAL	**464**	**24**	**4.91%**

Among 488 patients, 294 (60.24%) were females and 194 (39.75%) males but 18 out of 194 males (9.27%) and 6 out of 294 females (2.04%) got converted from laparoscopic cholecystectomy to open cholecystectomy. This is statistically significant proving that males are much more likely to get converted .Obesity (defined as BMI >30) was one of the factors in conversion. 45 patients out of 464(6.69%) of non-converted group and 10 out of 24 (41.66%%) of converted group were obese . A previous upper abdominal surgery was found to be a significant factor for conversion to OC. Total 13 out of 464 (2.80%) of non converted group and 4 out of 24(16.6%) of converted group had a previous upper abdominal surgery scar and LSCS scars in 3 females who underwent conversion due to other factors, was not a significant factor for conversion.

Table-2:

Causes of Conversion	No.(n=24)	Percentage
Malignancy	1	4.17%
Adhesions	16	66.66%
CBD Injury	2	8.33%
Bleeding	3	12.50%
CBD Stone	1	4.17%
Bowel Injury	1	4.17%
Instrument Failure	-	-
TOTAL	24	100

Table-2 shows the various cause of conversion.Adhesions in subhepatic and Calots triangle area led to maximum number (66.66%) of conversions.Significant bleeding not controlled laparoscopically and CBD injury were also responsible in few cases.There was no conversion due to instrument failure , as backup and spare set of instruments were readily available in such circumstances.

Table-3: Showing the prevalence of various Intraoperative complications

Complications	Non-converted LC Group(n=24)		LC to OC Converted Group(n=464)	
	No	%	No.	%
CBD Injury	1	4.16%	2	0.43%
Bleeding	6	25.00%	3	0.64%
Bowel Perforation	1	4.16%	-	

DISCUSSION

Laparoscopic cholecystectomy is currently the treatment of choice for gallbladder disease. It is considered 'Gold Standard' for gall bladder disease now a days. This is because of several advantages over open surgery, e.g., shorter hospital stay leading to early return to work, less post operative pain, faster recovery and better cosmesis. Conversion from laparoscopic to open cholecystectomy results in a substantial change in the outcome for the patient including rise in cost of surgery, operation and recovery time. The demography of the patient, comorbidities, surgeons experience and technical problems can play a role in the conversion. In the present study, which spanned a period of one year, surgeons were adequately experienced in LC e.g., more than 15 to 20 years. The conversion rate was 4.91%.Various studies have reported a conversion rates ranging from 2.6 to 14% in literature [4, 6]. The highest conversions took place in age group of 31-40 years in our study, followed by 41-50 years age group. Majority of previous studies showed increasing conversion rate with advancing age group [7, 10], but we did not observe this trend. This may be due to less number of older age group cases in our study. Out of 488 patients, males were 194 and females were 294, showing female preponderance of gallbladder disease. But 18 out of 194 males (9.28%) and 6 out of 294 females (2.04%) were converted from laparoscopic cholecystectomy to open cholecystectomy indicating that the conversion rate in males was significantly greater. Our observationis in accordance to that of the previous studies [8, 12, 14]. Female sex preponderance was visible in our study which is contrary to the observations of Shamim M *et al.*, who found the reverse trend in a newer study [11]. Obesity was found a contributory factor for conversion. 10 out of 24 (41.66%%) of converted group patients were obese .This is similar to the results of other studies [15, 16] who found obesity as a risk factor for conversion. Previous upper abdominal surgery was found to be a significant factors for conversion in this study. 4 out of 24(16.6%) of converted group had a previous upper abdominal surgery scar. Adhesions in GB and Calots triangle area was the commonest cause of conversion. Previous upper abdononal surgery is likely to produce extensive postoperative adhesions. Several studies have held responsible previous abdominal surgeries for increased need for adhesiolysis and a higher open conversion rate [18, 19]. But Genc V *et al.*, [17] did not find previous abdominal surgery to affect conversion rate which is in contrast to our study. This may be due to the fact that revision surgery cases tend to prefer treatment in hospitals like ours that are better equipped to deal with likely complications. Common bile duct injury, bleeding and finding of malignancy peroperatively were some other causes for conversion. Findings of common bile duct calculi and bowel injuries also led to conversion in this study. But instrument failure did not led to any conversion in our experience. Most of the studies have attributed inability to dissect the Calot's triangle safely as the reason for conversion [11, 15]. Bleeding was the only complication that was common to both laparoscopic cholecystectomy and converted to open cholecystectomy groups. While common bile duct injury, and bowel perforation was found more in the converted group Kwon et al. stated that accidental injuries to bile duct and bowel are important risks factors of laparoscopic cholecystectomy and requires conversion especially if the operating surgeon has less exposure and experience [20]. While bleeding is one of the recognised reasons of conversions in this study majority of bleeding cases were managed laparoscopically only [21, 22].

CONLUSION

Laparoscopic cholecystectomy is the preferred mode of surgery in a case of cholelithiasis and other gallbladder diseases. But in certain circumstances it has to be converted to open cholecystectomy in the interest of safety of patient. It should not be regarded as "failure' of LC. Male sex, adhesions due to various causes including previous upper abdominal surgery, injury to vital structures like common bile duct, bowel and occasionally bleeding can compel the surgeon to convert LC to OC. Although, conversion can lead to increased hospital stay and financial burden it shold be acceptable to both patient, sugeon and hospital management team. Prior knowledge of these factors may help in preoperative counselling of the patient and better surgical planning.

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