

Preoperative Predictors and Frequency of Conversion of Laparoscopic Cholecystectomy into Open Cholecystectomy

Conversion of
Laparoscopic
Cholecystectomy
into Open
Cholecystectomy

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ABSTRACT

Objective: Determining the preoperative risk factors and frequency of conversion of laparoscopic cholecystectomy into open cholecystectomy.

Study Design: Prospective study

Place and Duration of Study: This study was conducted at the Department of Surgery, Shaikh Zayed Hospital Lahore, from 1st June 2019 to 30th June 2021.

Materials and Methods: Two hundred and ninety one patients who were enrolled. Demographic data e.g. name, age, gender and address were obtained and clinical examinations were performed. All patients were admitted in surgical ward after preoperative workup and fitness for surgery. All of them were taken up on list for laparoscopic cholecystectomy. All the symptomatic patients undergoing laparoscopic cholecystectomy for gall bladder disease (gall stones, gall bladder polyp). Patients were excluded from the study who refused laparoscopic cholecystectomy.

Results: There were 167 (57.3%) females and 124 (42.6%) patients were males with mean age 35.27 ± 14.18 years. Mean duration of disease was 4.24 ± 3.98 years. Mean gall bladder thickness was 4.28 ± 1.06 mm. Excessive bleeding was the commonest per-operative complication found in 40 (14%) patients. Difficult laparoscopic cholecystectomy was found in 32 (11%) patients need conversion to open procedure. Post-operative wound infection found in 18 (6%) patients. Frequency of difficult laparoscopic cholecystectomy which needs conversion to open procedure was high in patients having increased thickness of gall bladder wall. In this study 32 patients (11%) were transitioned from laparoscopic cholecystectomy to open cholecystectomy. The most common cause of 21 (65.6%) was fibrosis in the Calots triangle and adhesion due to inflammation.

Conclusion: Conversion happened in 32 (11%) of the patients and mostly because of increased thickness of gall bladder. Even though other factors like bleeding per-operatively was important emphasis is made on timely conversion to avoid post-operative complications.

Key Words: Gall stones, Gall bladder polyp, Laparoscopic cholecystectomy, Open cholecystectomy

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INTRODUCTION

Gall stones are a major health problem in many parts of the world (15% of the total population of United States of America with total 20 million patients) having gallstones of 0.63/100 year.^{1,2} An annual surgical incidence of 4.2% in men and 14.2% in women was reported in a Pakistani study. Open cholecystectomy procedure to treat gallstones has increased incidence in adults.

First open cholecystectomy was performed by Carl Langebuch (Germany) in 1882 and first laparoscopic cholecystectomy by Professor Erich (Germany) in 1985 since from that time management of gall has been greatly improved. It has now been established without controversy that laparoscopic cholecystectomy can be performed safely, in most cases of severe cholecystitis, and if completed inadvertently, the benefits over open cholecystectomy are retained.^{3,4}

The benefits of laparoscopic surgery over traditional surgery include less surgical pain, shorter hospital stay, better self-correction effect, and earlier recovery.⁵ But conversion from laparoscopic cholecystectomy to open cholecystectomy is still very common and the risk factors associated with conversion are very useful pre-operatively.⁶ Lot of research has been performed by many people about the predictive risk factors for conversion worldwide and literature reveals that conversion rate is 2% to 22%.^{7,8} Predictability of features of laparoscopic cholecystectomy to open

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cholecystectomy may not only improve the patient's safety but may also help reduce the cost of treatment and may assist the surgeon in determining the most appropriate (open/laparoscopic) procedure for the patient, thus reducing the patient's problem, conversion rate and total treatment costs. There are a variety of risk factors identified for the conversion of the case such as wide dense adhesions that affect the appearance of the calots triangle, which is the most common cause. Acute cholecystitis is another cause which accounts 14 to 50% cases. Another cause is contracted gall bladder which results in difficulty in grasping during procedure accounts for 12%. Other causes are painful symptoms. Operative risk factors accounts for 8 to 15% cases and includes abnormalities of anatomy, hemorrhage, aberrant vessel (hepatic artery) or duct and any kind of injury to bile duct.⁹

MATERIALS AND METHODS

This study was done in General Surgery Department of Shaikh Zayed Hospital Lahore among all patients who underwent laparoscopic cholecystectomy during period of 2 years. All the symptomatic patients undergoing laparoscopic cholecystectomy for gall bladder disease (gall stones, gall bladder polyp) were included. All patients who have gall bladder perforation, gall bladder malignancy determined by preoperative scans, previous mid line laparotomy, upper abdominal surgery and CBD stones were excluded.

RESULTS

167 (57%) were women and 124 patients (43%) were menaged 35.27 ± 14.18 . The mean duration of the disease was 4.24 ± 3.98 years. The gallbladder thickness was 4.28 ± 1.06 mm. Excessive bleeding was a common functional problem with 40 patients (14%). Laparoscopic cholecystectomy was abandoned in 32 patients (11%) who needed to be rehabilitated to open the procedure. Post-surgical wound infection is found in 18 patients (6%). The frequency of laparoscopic cholecystectomy that needed to be adjusted to open the procedure was high in patients with a thick walled gall bladder.

Only adverse clinical factors showed significant predictive value ($p < 0.005$) and adverse radiological predictors did not show significant predictive value ($p < 0.065$). Among clinical predictors history of acute cholecystitis, BMI more than 30 and symptoms duration of more than 1 year showed statistically significant association. Male gender, age more than 50, deranged LFTs and radiological factors (single or impacted stone, thick wall, small contracted gall bladder) did not show significance. Clinical predictions are the most reliable factors. The use of good clinical judgment in relation to existing difficulties and complications and understanding of available facilities and resources is essential in making a decision in every

case.

32 patients (11%) were transitioned from laparoscopic cholecystectomy to open cholecystectomy. The most common cause of 21 cases (65%) was fibrosis in the triangle of calot and adhesion due to inflammation. The next most common cause is acute cholecystitis 9 (28.1%) and 3 gallbladder contractor (9.4%) cases. The patients who converted the majority of 10 (66.7%) were 41-60 years old and in patients who had laparoscopic cholecystectomy the majority of 70 (44.9%) of patients who were 30-70 years of age.

The high conversion rate in men is difficult to explain. The explanation may be that men are more likely to have a delay in seeking help and thus expose themselves to a more complex disease and problems during surgery.

Table No.1: Age distribution of patients (n=291)

Age (years)	No.	%
10-20	2	0.68
21-30	37	12.71
31-40	61	20.96
41-50	111	38.14
51-70	72	24.74
>70	8	2.74
Mean±SD	45.46±1.12	

Table No.2: Sex distribution of patients (n=291)

Sex	No.	%
Male	124	43.0
Female	167	57.0
M:F ratio	1:1.34	

Table No.3: Demographic data of patients (n=291)

Data	No.	%
Laparoscopic cholecystectomy	199	68.38
Open cholecystectomy	59	20.27
Conservative treatment	1	0.34
Lap. to open conversion	32	10.99

Table No.4: Treatment according to sex of patients (n=291)

Data	Male		Female	
	No.	%	No.	%
Laparoscopic cholecystectomy	112	38.49	86	29.55
Open cholecystectomy	36	12.37	23	7.91
Conservative treatment	-	-	1	0.34
Lap. to open conversion	19	6.53	14	4.81

DISCUSSION

The rate of conversion of laparoscopic cholecystectomy to open cholecystectomy is very high. Nine patients

(27.2%) had severe inflammation of the gallbladder. Male sex, older than 60 years, previous upper abdominal surgery, diabetes and acute inflammation are all closely related to the high conversion rate of laparoscopic cholecystectomy to laparotomy. In patients of cholecystitis with elevated white cell count, elevated bilirubin level, fever, elevated ALT and AST all are associated with conversion of laparoscopic cholecystectomy to open cholecystectomy. These risk factors are not contraindications for laparoscopic cholecystectomy. Knowledge of these risk factors results in prediction of severity of procedure and surgeon should counsel and inform the patients regarding risk of conversion of procedure.^{10,11} Inflammation is most common cause of conversion of procedure in acute cholecystitis. Other predictors of conversion are advanced age, male gender and elevated white cell count. Prospective studies with large number of cases should be carried out to know the validity of these predictors.¹² Age, obesity, history of previous surgery (upper abdominal), Sex, white blood cell count, alkaline phosphatase level, and contracted gall bladder on ultrasound all are risk factors and predictors of conversion of laparoscopic cholecystectomy to open cholecystectomy.¹³ A large number of studies reported a rate of laparoscopic cholecystectomy modification to open cholecystectomy at 2 to 15%. Conversion to open cholecystectomy is not a disadvantage for the surgeon but is considered a wise decision by a vigilant surgeon.¹⁴

The risk of conversion of laparoscopic cholecystectomy to open cholecystectomy is related to a variety of factors such as surgeon competency, mechanical failure and other most importantly patients since literature have revealed patient risk factors such as age, gender, Body mass index (BMI) and previous surgery (upper abdominal). Radiological findings on ultrasound such as contracted gallstones, one large stone, gallbladder stiffness and pericholecystic fluid collection are associated with difficulty during laparoscopic cholecystectomy.¹⁵ Hemorrhage during the separation of the gallbladder from the liver bed was the most common finding in our study 35.7%, and was followed by 33.3% local adhesion and gall bladder perforation was observed in 7.8% of cases. Thirty two patients had turned to open procedure had a wall thickness between 4.1 to 6mm. Similarly the conversion rate was found to be higher in patients with symptoms for over 5 years. Ultrasound of gall bladder for wall thickness is a good predictor of difficult cholecystectomy. It should be used as a measure of anticipation of serious cases and the patient should be properly advised that it may be possible to switch to open cholecystectomy.¹⁶

Kumar et al¹⁷ with a conversion rate of 10.7%. Daradkeh¹⁸ reported a conversion rate of 2.6% from LC to OC and Dalal et al¹⁹ reported a rate of 1.27%. The literature reported a wide variation between

conversion rates of laparoscopic to open cholecystectomy. This variation in rate of conversion ranges from 2% to 15%.²⁰ In the present study, there was no significant relationship ($p > 0.05$) between age and conversion rate, but there was a significant correlation ($p < 0.05$) of gender and conversion rate. Patients with certain risk factors before surgery may experience complications during or after surgery. Predictability of patients at high risk of converting to open cholecystectomy has few potential benefits.²¹

Sharma et al²² found that the chances of bleeding in the liver bed, local adhesion and the difficult formation of the calot triangle were high in the previous group. Factors responsible for open transformation were thick adhesion in 21 (65.62%), abnormal anatomy of the triangle at 3 (9.31%), significant intra-operative bleeding 5 (15.6), CBD damage 1 (3.13%) visceral damage 0 (0.0%) and equipment failure in 1 conversion (3.1%). The open conversion rate of laparoscopic cholecystectomy in this study was 10.99%. The most common cause was the thick adhesion around the gallbladder. Preventable features such as equipment failure or power breakage can be prevented with reliable maintenance¹⁷ ERCP implementation prior to surgical intervention appeared to be associated with an increased incidence of conversion in our study. There is no significant relationship between ever and changing to open surgery according to our study. Sex (male), gall bladder wall thickness, size of gall stone, shape of gall stone, acute cholecystitis and ultrasound evidence of pericholecystic fluid have been strongly associated with conversion.¹⁸ Ercan et al²³, Harboe et al²⁴, all revealed that conversion is associated with male sex. So gender is highly predictable in this study. Chandio et al²⁵ revealed that sex is not associated with conversion.

This study revealed any association between obesity ($BMI > 30 \text{ kg/m}^2$) and conversion, Airan et al²⁶ and Tang et al²⁷ revealed obesity as strongly associated with conversion. Hutchinson et al²⁸ revealed that BMI ($> 27.2 \text{ kg/m}^2$) as an important predictor of a three-fold conversion rate. The co-morbid conditions i.e. hypertension and diabetes was not dangerous for our study, similar to Alponat et al²⁹ and Kama et al³⁰ revealed that by increasing experience of the surgeon and the improvement in the surgical apparatus can lead to a reduction of the conversion rate in these patients. Nine patients (1.5%) required conversion from laparoscopic to open cholecystectomy. The rate of conversion to open cholecystectomy in our study was within the 2-22%.

Analysis of various preoperative factors has shown that patients who need to undergo open surgery are more likely to exhibit the following characteristics: male sex, 40 years of age, diabetes history, history of hospitalization with gallstones and total increase in bilirubin, direct bilirubin, or alkaline phosphatase

levels. We found that adhesions, bleeding, and sprains were associated with alteration. These findings are consistent with those of previous reports in the literature.³¹⁻³²

CONCLUSION

Laparoscopic cholecystectomy is the gold Standard for both acute and chronic cholecystitis and 100% of the cases must begin with laparoscopic cholecystectomy. Several factor contribute to conversion to open technique among which increased gall bladder thickness is the most common. Other factors may also contribute like increased bleeding per operatively for more than 5 minutes and adhesions in the calots triangle. Conversion happened in 32 (11%) of the patients in our study and mostly because of increased thickness of gall bladder. Even though other factors like bleeding per-operatively was important emphasis is made on timely conversion to avoid postoperative complications.

Author's Contribution:

Concept & Design of Study: Muhammad Imran
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