

Evaluation of Factors for Conversion of Laparoscopic to Open Cholecystectomy in a Tertiary Care Center

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ABSTRACT

Introduction: Laparoscopic cholecystectomy is the treatment of choice for gall bladder diseases. Sometimes it has to be converted to open surgery because of various reasons.

Aim: To evaluate and analyse the various factors leading to conversion of laparoscopic cholecystectomy to open cholecystectomy in cases of cholecystitis with cholelithiasis.

Materials and Methods: A total of 505 laparoscopic cholecystectomies were attempted in Rohilkhand Medical College Bareilly, India from September 2014 to August 2015. Of these 37 (7.3%) were converted to open cholecystectomy. An analysis of different factors were

made that lead to conversion.

Result: About 7.3% of the total surgeries required conversion. Male patients were more prone for conversion (12.3%) as compared to females (4.9%). The most common intraoperative finding that lead to conversion was adhesions in 23 out of 37 (62.1%). These converted patients were found to have more chances of injuries the common bile duct and bowel and post-operative infections.

Conclusion: Male patient and intraoperative findings of adhesions lead to the highest possibility of conversion of laparoscopic to open cholecystectomy. Knowledge of these factors helps in better preoperative counseling of patients as well as proper surgical planning.

Keywords: Acute cholecystitis, Adhesions, Cholelithiasis, Inflammation

INTRODUCTION

Cholecystectomy is generally indicated in patients with symptomatic cholelithiasis. Some patients with risk factors for complications of gall stones may be offered cholecystectomy even with asymptomatic gall stones. The other indications of cholecystectomy are acute cholecystitis and carcinoma gall bladder. The first cholecystectomy was performed in late 1800's by Langenbuch. In 1980's, laparoscopic cholecystectomy (LC), was started [1]. Laparoscopic cholecystectomy has the advantage of shorter hospital stay, less post-operative pain, faster recovery, better cosmesis and lower cost over open cholecystectomy [2]. Laparoscopic cholecystectomy is the treatment of choice in today's era. Open cholecystectomy is reserved for special situations like dense adhesions, common bile duct problems etc., [3].

Despite all its advantages, sometimes the surgeon has to convert laparoscopic cholecystectomy to open cholecystectomy for a safe finale to the surgery. Conversion rate of 2.6-14% has been described in the literature [4,5]. Many studies have identified different reasons for such conversions surgeries namely difficult dissection following adhesions, severe inflammation

common bile duct problems, complications such as bleeding, equipment problems etc [6,7].

Every surgeon should know the factors leading to conversion of laparoscopic cholecystectomy to open cholecystectomy for a better understanding of the limitations and improved pre-operative patient counseling.

MATERIALS AND METHODS

A retrospective study of one year duration including 505 patients was conducted on admitted patients of cholecystitis with cholelithiasis in Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, India, during the period from September 2014 to August 2015. This is a tertiary care centre. Ethical clearance from ethical committee was taken for the study.

Inclusion criteria were all patients diagnosed with acute cholecystitis with cholelithiasis. Exclusion criteria were patients with palpable lump, common bile duct calculi, 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, urine routine and microscopy.

All patients received third generation cephalosporin (ceftriaxone) 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 cannula) was inserted in the sub umbilical region. Three 5-10 mm ports were inserted along the subcostal margin under direct vision at midline, mid clavicular and right anterior axillary line. Conversions whenever done, were performed by median or subcostal incision. Post surgery drain was placed routinely in all the patients. An analysis of patient demographics, intraoperative factors, complications, reason for conversion and duration of hospital stay was performed.

STATISTICAL ANALYSIS

Statistical analysis of the data was done by the statistical package for the social science (SPSS 17.0) using independent 't'-test and Chi-square test values of $p < 0.05$ were considered statistically significant. The data was compiled using Microsoft excel sheet (Windows 2007).

RESULTS

A total of 505 patients were taken up for laparoscopic cholecystectomy during this time, 37 (7.3%) of which were converted to open cholecystectomy.

[Table/fig-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%) presented in the age group of 31-40 years and highest number of conversions 13 (2.5%) also took place in the same group.

Age Group (in years)	Non Converted Group (laparoscopic cholecystectomy)	Converted group (laparoscopic cholecystectomy open cholecystectomy)	Conversion rate
	(n=468)	(n=37)	
20-30	102	8	7.2%
31-40	180	13	6.7%
41-50	109	10	8.4%
51-60	51	4	7.2%
61-70	26	2	7.1%
Total	468	37	-
Mean±SD	39.6±11.3	41.1±11.3	-
T= 0.7773	p=0.4373	Not significant	-

[Table/Fig-1]: Age group distribution of patients. $p < 0.05$ consider statistically significant.

Among 505 patients, 342 (67.7%) were females and 163 (32.2%) males but 20 out of 163 males (12.3%) and 17 out of 342 females (4.9%) got converted from laparoscopic cholecystectomy to open cholecystectomy. This is statistically significant proving that males are more likely to get converted ($p = 0.003$, $\chi^2 = 8.66$).

Obesity (defined as BMI >30) was not a significant factor in conversion. Twenty four patients out of 468 (5.1%) (non-converted group) and four out of 37 (10.8%) (converted group) were obese ($p = 0.146$).

Even a previous abdominal surgery was not found to be a significant converting factor. Total 11 out of 468 (2.3%) (non converted group) and one out of 37 (2.7%) (converted group) had a previous abdominal surgery ($p = 0.892$).

[Table/fig-2] shows the various cause of conversion maximum conversions occurred due to findings of adhesions (62.2%).

[Table/fig-3] compares the complications in both the groups common bile duct injury, infection and perforation (bowel) was significantly more prevalent in the converted group. While the incidence of bleeding was same in both the groups.

Surprisingly there was only one mortality in the non converted group which happened three weeks post surgery because of biliary peritonitis in a patient who never turned up for follow-up.

Causes of Conversion	No. (n=37)	Percentage (%)
Malignancy	2	5.4%
Adhesions	23	62.2%
CBD injury	4	10.8%
Instrument failure	3	8.1%
Bleeding	3	8.1%
CBD stone	1	2.7%
Bowel injury	1	2.7%

[Table/Fig-2]: Causes of conversion.

Complication	Non converted LC (n=468)	Converted Group LC to OC (n=37)	χ^2 -value	p-value (result)
	No. (%)	No. (%)		
CBD injury	0 (0%)	4 (10.8%)	51.0	<0.001 (highly significant)
Bleeding	15 (3.2%)	3 (8.1%)	2.40	0.121 (not significant)
Infection	6 (1.3%)	6 (16.2%)	33.0	<0.001 (highly significant)
Perforation bowel	0 (0%)	1 (2.7%)	12.7	<0.001 (highly significant)

[Table/Fig-3]: Complication.

$p < 0.05$ consider statistically significant; LC-laparoscopic cholecystectomy; OC-open cholecystectomy

DISCUSSION

Laparoscopic cholecystectomy is the treatment of choice for gallbladder disease. It is one of the most common laparoscopic surgeries performed now a days. The advantages being shorter hospital stay, less post operative pain, faster recovery and better cosmesis. Conversion from laparoscopic to open cholecystectomy results in a significant change in the outcome for the patient including rise in cost of surgery, operation and recovery time.

The demography of the patient, associated pathology, surgeons experience and technical problem can play a role in the conversion.

In this study, which spanned a period of one year, all surgeons were in the learning phase defined as less than 50 cases per surgeon. The conversion rate was 7.3%.

Various studies give a rate ranging from 2.6 to 14% [4-6]. The mean age in the converted group in our study was 41.1 years as compared to the non converted group which was 39.6 years. This difference was not statistically significant. All age groups showed similar conversion rates. Majority of previous studies showed increasing conversion rate with advancing age group [7-10]. While Shamim M et al., demonstrated the reverse in a newer study [11]. Out of 505 patients, males were 163 and females were 342, showing preponderance of gallbladder disease in females. But 20 out of 163 males (12.2%) and 17 out of 342 females (4.9%) were converted from laparoscopic cholecystectomy to open cholecystectomy indicating that the conversion rate in males was significantly higher ($p=0.003$). Our observation in accordance to that of the previous studies [8,12-14].

Some studies mention obesity as a risk factor for conversion, but the present study failed to show it as a cause [15,16].

Similarly, previous abdominal surgery also did not significantly increase the chance of conversion. This was similar to the study conducted by Genc V et al., [17].

But other studies associated previous abdominal surgeries to an increased need for adhesiolysis and a higher open conversion rate [18,19]. Majority of the conversions in the present study were due to adhesions (62.2%). Common bile duct injury, instrument failure, bleeding and malignancy findings were some other causes. Findings of common bile duct calculi and bowel injuries also led to conversion in this study.

Many studies have identified inability to dissect the Calot's triangle properly 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, infection and bowel perforation was found more in the converted group and the difference was found to be highly

significant. This corroborates the study done by Kwon AH et al., which states that, accidental injuries to bile duct and bowel are risks factors of laparoscopic cholecystectomy and requires conversion especially in the learning curve of the surgeon [20].

While bleeding is one of the recognised reasons of conversions in this study majority of bleeding cases were managed laparoscopically only [21].

LIMITATION

The present study included 505 patients who were admitted with acute pain in the right hypochondrium and were diagnosed as acute cholecystitis with cholelithiasis on ultrasonography, and underwent elective laparoscopic cholecystectomy.

CONCLUSION

Laparoscopic cholecystectomy is the preferred mode of surgery in a case of cholelithiasis. Sometimes it has to be converted to open cholecystectomy. Male sex, adhesions (intraoperative), injury to vital structures like common bile duct and occasionally bleeding can lead to conversion. Although, conversion can lead to increased hospital stay and financial burden, knowledge of these factors may help in pre information of patient and patient counseling can be further improved.

REFERENCES

- [1] De U. Evolution of cholecystectomy: A tribute to Carl August Langenbuch. *Indian J Surg.* 2004;66:97-100.
- [2] Nidoni R, Udachan TV, Sasnur P, Baloorkar R, Sindgikar V, Narasangi B. Predicting difficult laparoscopic cholecystectomy based on clinicoradiological assessment. *J Clin Diagn Res.* 2015;9(12):PC09-12.
- [3] Gill HS, Gupta A, Singh B. Evaluation of the role of various factors in conversion of laparoscopic cholecystectomy into open cholecystectomy. *International Journal of Contemporary Medical Research.* 2016;3(10):3031-35.
- [4] Bingener-Casey J, Richards ML, Strodel WE, Schwesinger WH, Sirinek KR. Reasons for conversion from laparoscopic to open cholecystectomy : a 10 years review. *J Gastrointest Surg.* 2002;6(6):800-05.
- [5] Daradkeh S. Laparoscopic cholecystectomy analytical study of 1208 cases. *Hepatogastro Enterology.* 2005;52:1011-14.
- [6] Peters JH, Krailadsiri W, Incarbone R, Bremner CG, Froes E, Ireland AP, et al. Reasons for conversion from Laparoscopy to open cholecystectomy in an urban teaching hospital. *Am J Surg.* 1994;168(6):555-58.
- [7] Liu C, Fan ST, Lai EC, Lo CM, Chu KM. Factors affecting conversion of laparoscopic cholecystectomy to open surgery. *Arch Surg.* 1996;131(1):98-101.
- [8] Ibrahem S, Hean TK, Ho LS, Ravintharan T, Chye TN, Chee CH. Risk factors for conversion to open surgery in patients undergoing laparoscopic cholecystectomy. *World J Surg.* 2006;30(9):1698-704.
- [9] Wiebke EA, Pruitt AL, Howard TJ, Jacobson LE, Broadie TA, Goulet RJ Jr, et al. Conversion of laparoscopic to open cholecystectomy. An analysis of risk factors. *Surg Endosc.* 1996;10(7):742-45.

- [10] Lo CM, Fan ST, Liu CL, Lai EC, Wong J. Early decision for conversion of laparoscopic to open cholecystectomy for treatment of acute cholecystitis. *Am J Surg.* 1997;173(6):513-17.
- [11] Shamim M, Memon AS, Bhutto AA, Dahri MM. Reasons of conversion of laparoscopic to open cholecystectomy in a tertiary care institution. *J Pak Med Assoc.* 2009;59(7):456-60.
- [12] Brodsky A, Matter I, Sabo E, Cohen A, Abrahamson J, Eldar S. Laparoscopic cholecystectomy for acute cholecystitis: can the need for conversion and the probability of complications be predicted? A prospective study. *Surg Endosc.* 2000;14(8):755-60.
- [13] Al Salamah SM. Outcome of laparoscopic cholecystectomy in acute cholecystitis. *J Coll Physicians Surg Pak.* 2005;15(7):400-03.
- [14] Lim SH, Salleh I, Poh BK, Tay KH. Laparoscopic cholecystectomy : an audit of our training programme. *ANZ J Surg.* 2005;75(4):231-33.
- [15] Gabriel R, Kumar S, Shrestha A. Evaluation of predictive factors for conversion of laparoscopic cholecystectomy. *Kathmandu Univ Med J.* 2009;7(25):26-30.
- [16] Lim KR, Ibrahim S, Tan NC, Lim SH, Tay KH. Risk factors for conversion to open surgery in patients with acute cholecystitis undergoing interval laparoscopic cholecystectomy. *Ann Acad Med Singapore.* 2007;36:631-35.
- [17] Genc V, Sulasmanov M, Basceken SI, Basceken SI, Erverdi N, Gurel M, et al. What necessitates the conversion to open cholecystectomy? A retrospective analysis of 5164 consecutive laparoscopic operations. *Clinics (Sao Paulo).* 2011;66(3):417-20.
- [18] Tang B, Cuschieri A. Conversions during laparoscopic cholecystectomy : risk factors and effects on patient outcome. *J Gastrointest Surg.* 2006 ;10(7):1081-91.
- [19] Kaafarani HM, Smith TS, Neumayer L, Berger DH, Depalma RG, Itani KM. Trends, outcomes and predictors of open and conversion to open cholecystectomy in Veterans Health Administration hospitals. *Am J Surg.* 2010;200:32-40.
- [20] Kwon AH, Thui H, Kamiyama Y. Laparoscopic management of bile duct and bowel injury during laparoscopic cholecystectomy. *World J Surg.* 2001;25:856-61.
- [21] Misawa T, Koike M, Suzuki K, Unemura Y, Murai R, Yoshida K, et al. Ultrasonographic assessment of the risk of injury to branches of the middle hepatic vein during laparoscopic cholecystectomy. *Am J Surg.* 1999;178:418-21.

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