CONVERSION OF LAPAROSCOPIC CHOLECYSTECTOMY TO OPEN CHOLECYSTECTOMY: PREOPERATIVE RISK FACTORS AND INTRAOPERATIVE REASONS

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ABSTRACT

Objective: To identify the frequency, associated risk factors and intraoperative reasons for conversion of Laparoscopic Cholecystectomy to open Cholecystectomy.

Study Design: Case series study.

Place and Duration of Study: This study was conducted in department of Surgery, Combined Military Hosptial Rawalpindi, from May to Oct, 2018.

Methodology: Patients admitted for laparoscopic cholecystectomy were included in the study. Demographic information, ASA Score of physical health, Ultrasonogram Abdomen findings and presence of pericholecystic fluid were documented. The reasons for conversion from laparoscopic cholecystectomy (LC) to open Cholecystectomy (OC) for example excessive haemorrhage, visceral injury, equipment failure, injury to Common bile duct were also noted.

Results: In this study 15 (8.77%) patients were converted from laparoscopic cholecystectomy to open cholecystectomy. The most common reason 6 (40%) of conversion was Fibrosis at Calots Triangle and Adhesions due to inflammation. In patients who converted most 10 (66.7%) were 41-60 years old and in patients who had successful laparoscopic cholecystectomy majority 70 (44.9%) patients belonged to age group 21-40 years. The male gender had significantly (p-value <0.05) higher rate of conversion (53.3% vs. 46.7%). There was significant (p-value <0.05) association of ASA score and presence of pericholecystic fluid with rate of conversion.

Conclusion: Male gender, higher ASA score, and presence of pericholecystic fluid are significant contributors for conversion of laparoscopic cholecystectomy to open cholecystectomy. The most common reason for conversion was Fibrosis at Calots Triangle and Adhesions due to inflammation.

Keywords: Conversion rate, Laparsocopic cholecystectomy, Open cholecystectomy, Risk factors.

INTRODUCTION

Presence of gallstones is quite a common cause of abdominal pain; this pain is usually referred to surgical specialist for management. Cholecystectomy is considered as the only effective management for symptomatic gallstones[1]. The advancement in technology has replaced the open cholecystectomy (OC) with laparoscopic cholecystectomy (LC) in most of the cases. The main reasons for this widespread acceptance are the advantages associated with laparoscopic cholecystectomy like LC is minimally invasive procedure in nature, so it has significantly decreased pain after the procedure reduces stay in the hospital with early recovery and better cosmetic results. These advantages make it as first choice for management of gallstone. But there are various reasons intraoperatively for which it become necessary to convert laparoscopic cholecystectomy to open cholecystectomy. These reasons may be related to patient, equipment and expertise of surgeon. The rate of this conversion varies in different studies from 2% to 15% due to above mentioned reasons[2,3]. Prior prediction of possible conversion from LC to open is almost impossible on the basis of demographic and clinical features of the patient alone[4]. Conversion

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to open surgery increases operative time, complication rates, cost of treatment and hospital stay[5,6].

Available literature suggests that risk factors that may predict conversion are: acute cholecystitis, older age, male gender, high BMI, and a thickened gallbladder wall on Ultrasound abdomen. On the contrary, many studies have failed to prove that male gender is a risk factor for conversion; rather, they noted a combination of risk factors, including old age, acute cholecystitis and history of upper abdominal surgery[7].

The identification of risk factors for the conversion before surgery will help the surgeon to consider the appropriate plan of action and as a result counsel the patient accordingly. This pre hand identification is not possible in all the cases because during laparoscopy iatrogenic injury of the bile duct, excessive bleeding or visceral injury may occur and may result in conversion. However, risk factors which can be predicted are identified by personal history, physical examination, laboratory tests, ultrasound abdomen and pre anaesthesia assessment etc[8,9].

The conversion in majority of the cases proves to be a wise decision as it helps to avoid further risks or damage to the patient. However, it is associated with longer operation time and hospital stay and reduces cost effectivity. Therefore, there is a need to identify the risk factors that may lead to conversion to open cholecystectomy[10].

Objective of the study was to determine the frequency of conversion of laparoscopic cholecystectomy to open cholecystectomy in a tertiary care teaching hospital and to determine the factors responsible for conversion of laparoscopic cholecystectomy to open cholecystectomy.

METHODOLOGY

This case series study was conducted in a period of six months from May to October 2018, during our compulsory rotation in surgical department CMH Rawalpindi for basic laparoscopic surgical skills course. The study was conducted after taking approval form hospital ethics committee. All the patients admitted for laparoscopic cholecystectomy in the department of general surgery were included in the study after taking informed written consent from all the participants.

A total of 171 patients who were admitted for laparoscopic cholecystectomy were selected for the study. The sample size was calculated by WHO sample size calculator by using 95% confidence level, the LC to OC conversion rate of 12.7% and absolute precision level of 5%. Patients were selected by nonprobability consecutive sampling. Patients who were already planned for elective open cholecystectomy and for whom laparoscopic cholecystectomy was combined with other procedures were excluded from the study.

Detailed demographic information of the patients including name, age, gender, mode of admission (emergency or elective) their clinical and physical examination details, past history of laparotomies, BMI, ASA score, presence of co-morbidities like diabetes, hypertension etc were noted. All the laboratory investigation results including liver function tests, ultrasound abdomen findings, presence of peri cholecystic fluid, peri-operative findings and complications were documented. The main outcome of the study, the main reason of conversion from LC to OC like haemorrhage, visceral injury, injury to CBD, equipment failure and fibrosis at Calot`s triangle were also noted.

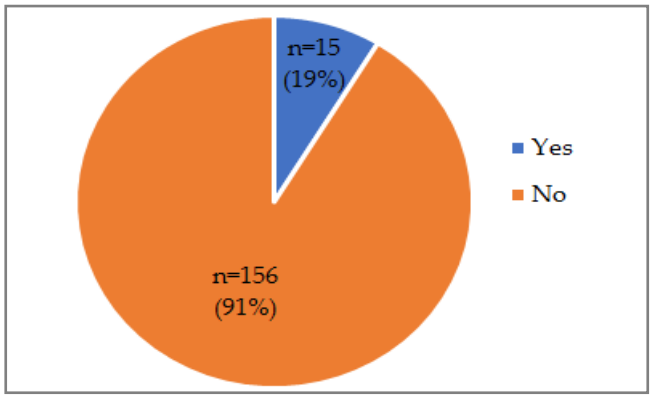

Figure: Rate of conversion from laparoscopic cholecystectomy to open cholecystectomy.

All the collected data was entered in SPSS-21 for analysis. Descriptive statistics including mean and standard deviation were calculated for quantitative data and frequencies with percentages were calculated for qualitative data. Chi-square test was applied to compare the qualitative variables between male and females. *p*-value ≤0.05 was considered significant.

RESULTS

A total of 171 patients under-going either elective or emergency laparoscopic cholecystectomy were selected. Out of this 15 (8.77%) patients required conversion from laparoscopic cholecystectomy to open cholecystectomy. The

Table-I: Reason of conversion from laparoscopic cholecystectomy to open cholecystectomy.

Reason	n (%)
Injury to CBD	1 (6.7)
Fibrosis at Calots Triangle	3 (20)
Adhesions due to inflammation	4 (26.7)
Adhesions due to previous surgery	1 (6.7)
Fibrosis at Calots Triangle and Adhesions due to inflammation	6 (40)

Table-II: Association of demographic characteristics with conversion of laparoscopic cholecystectomy to open cholecystectomy.

Characteristics	Converted From Laparoscopic Cholecystectomy to Open Cholecystectomy		*p*-value
	Yes (n=15), n (%)	No (n=156), n (%)	
Age of Patient			
<20 years	-	4 (2.63%)	0.085
21-40 years	2 (13.3%)	70 (44.93%)	
41-60 years	10 (66.73%)	66 (42.33%)	
>60 years	3 (20.03%)	16 (10.33%)	
Gender			
Male	8 (53.33%)	42 (26.93%)	0.032
Female	7 (46.73%)	114 (73.13%)	
Mode of Admission			
Emergency	6(40.03%)	38 (24.43%)	0.186
Elective	9(60.03%)	118 (75.63%)	
Body Mass Index			
<30	10 (66.73%)	109 (69.93%)	0.797
>30	5 (33.33%)	47 (30.13%)	
Previous Laparotomies			
Yes	4 (26.73%)	43 (27.63%)	0.941
No	11 (73.33%)	113 (72.43%)	
ASA			
1	2 (13.33%)	71 (45.53%)	0.028
2	10 (66.73%)	74 (47.43%)	
≥3	3 (20.03%)	11 (7.13%)	
Co-Morbidities			
Diabetes Mellitus	4 (26.73%)	47 (30.13%)	0.280
Hypertension	10 (66.73%)	68 (43.63%)	
Ischemic Heart Disease	-	5 (3.23%)	
None	1 (6.73%)	36 (23.13%)	
Gall Bladder Wall Thickness			
≤3 mm	5 (33.33%)	92 (59.03%)	0.056
≥3 mm	10 (66.73%)	64 (41.03%)	
Presence of Peri cholecystic Fluid			
Yes	12 (80.03%)	19 (12.23%)	<0.001
No	3 (20.03%)	137 (87.83%)	

most common reason 6 (40%) of conversion was Fibrosis at Calots Triangle and Adhesions due to inflammation both in same patient, followed by 4 (26.7%) Adhesions due to inflammation, and 3 (20%) Fibrosis at Calots Triangle as elaborated in table-I.

In patients who were converted to open cholecystectomy, 10 (66.7%) patients belonged to age group of 41-60 years followed by 3 (20%) who had age of >60 years. And in patients who had successful laparoscopic cholecystectomy majority 70 (44.9 %) of patients belonged to age group 21-40 years followed by 66 (42.3%) and 16 (10.3%) patients who belonged to 41-60 years and >60 of age groups respectively. But according to the results there was no significant (*p*-value >0.05) relationship between age and conversion rate. There was however significant (*p*-value <0.05) association of gender with rate of conversion. The male gender had significantly higher rate of conversion (53.3% vs. 46.7%) as compared to females. The most common mode of admission was elective in both cases who were either converted or in whom the procedure was completed successfully laparoscopically. In our study the body mass index did not show any significant (*p*-value >0.05) difference in rate of conversion among patient having BMI <30 and those who had BMI >30. Previous laparotomies also did not affect the rate of conversion significantly (*p*-value >0.05) in our study.

There was significant (*p*-value <0.05) association between ASA score and rate of conversion of laparoscopic cholecystectomy to open cholecystectomy. The patients having ASA score of 2 had highest frequency 10 (66.7%) of conversion followed by the 3 patients (20%) who had ASA of 3 or more. The results showed that there was no significant (*p*-value >0.05) relationship between co-morbids and gall bladder wall thickness. Although the descriptive results showed some difference but this difference was not statistically significant. The presence of peri cholecystic fluid had a significant (*p*-value <0.05) relationship with conversion of laparoscopic cholecystectomy to open cholecystectomy. The patients who had peri cholecystic fluid had a significantly higher 12 (80%) rate of conversion as compared to 19 (12.2%) patients who did not convert from LC to OC as elaborated in table-II.

DISCUSSION

Conversion to open surgery from laparoscopic cholecystectomy is required when safe completion of the LC cannot be ensured. It is considered a sound judgment rather than a failure of the laparoscopic procedure and helps a great deal to avoid complications and reduce morbidity. The advantages and safety of LC have made it a standard procedure for the treatment of symptomatic gall stones. But in spite of its many advantages, 2-15% of conversion rates have been reported in various studies[11].

Laparoscopic cholecystectomy is converted to open cholecystectomy only in cases when a safe completion of the former procedure cannot be ensured. Rather than a failure of surgery, it is a good judgment by the attending surgeon, to avoid the forthcoming complications of the laparoscopic cholecystectomy. Thus, the identification of factors which can predict the conversion of the surgery helps in proper preoperative planning of the surgery including appropriate counseling of the patients and relatives[12].

The decision for conversion of laparoscopic cholecystectomy to open cholecystectomy is quite difficult and it can be based upon spectrum of disease, presence of co morbidities, surgical expertise and technical factors involved. The demographic parameters of the patient can also play a key role in the decision-making. The delay in decision of conversion may cause significant complication in terms of serious iatrogenic injuries, so elective and early decision is preferable. The conversion rate is still quite high even though laparoscopic skills have improved with advancement of technology and increasing experience of laparoscopic surgeons[13].

In our study 8.77% patients were converted from laparoscopic cholecystectomy to open cholecystectomy. Which is very much similar to previous studies of Paidipelly *et al*[14], who found a

conversion rate of 8.7%, 10 Khatoon *et al*, 6.46%, Kumar *et al*[15], with a conversion rate of 10.7%. Some studies have reported very less conversion rate like Daradkeh[16], reported a conversion rate of 2.6% from LC to OC and Dalal *et al*[17], 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%[18].

In our study, we determined the various reasons for conversion of elective laparoscopic cholecystectomy to an open procedure[19]. According to the results, there was no significant (*p*-value >0.05) relationship between age and conversion rate, but there was significant (*p*-value <0.05) association of gender with rate of conversion. The male gender had significantly higher rate of conversion (53.3% vs. 46.7%) as compared to females. These results on the basis of age are different from literature where higher age of >60 years is a risk factor for conversion[20]. Previous studies also suggest that male gender is a significant contributor towards increasing the chance of LC conversion to OC which is also supported by our data.

In our study the body mass index did not show any significant (*p*-value >0.05) difference in rate of conversion among patient having BMI less than 30 and who had BMI >30. Similarly, the results of this study showed that previous laparotomies also did not affect the rate of conversion significantly (*p*-value >0.05). But the literature shows that higher BMI and history of abdominal surgery has a significant relationship with conversion of LC to OC[21], These findings may partly be attributed to the level of surgical expertise since difficulties encountered because of high BMI and previous surgeries can be best dealt by the most experienced hand available at the time of surgery and all these cases were carried out at CMH Rawalpindi which is considered as the Centre of Excellence for Minimally Invasive Procedures and laparoscopic surgeries in Pakistan Armed Forces.

Patients who have certain preoperative risk factors are likely to encounter complications during surgery or postoperatively. Therefore, a pre hand thorough review of all the risk factors based on the history, physical examination and laboratory investigations before surgery will help the surgeons a great deal to encounter the difficulty during Laparoscopy. Preoperative prediction of patients at increased risk of conversion to open cholecystectomy has several potential advantages. Low risk patients could be identified and appropriately scheduled in an ambulatory care facility, and selected as training cases for surgical trainees, whilst high risk patients should be appropriately counselled and operated by experienced surgeons[22], or alternatively can be directly placed for open surgery.

CONCLUSION

The results of this study revealed that male gender, higher ASA score, and presence of peri cholecystic fluid are significant pre-existing contributors for conversion of laparoscopic cholecystectomy to open cholecystectomy. Higher age, obesity and acute colecystitis can be other main risk factors for conversion of LC to open cholecystectomy. The most common reason 6 (40%) of conversion in this study was Fibrosis at Calots Triangle and Adhesions due to inflammation combined, followed by (26.7%) Adhesions due to inflammation alone, and (20%) Fibrosis at Calots Triangle in isolation. A thorough review of all the risk factors before surgery can help the surgeon to either go ahead with LC or convert it into open cholecystectomy right in the beginning ensuring patient safety which is the main stay of all medical treatment.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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