FACTORS LEADING TO CONVERSION OF LAPAROSCOPIC CHOLECYSTECTOMY TO OPEN CHOLECYSTECTOMY

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ABSTRACT

Objective: To evaluate the various factors leading to conversion of laparoscopic cholecystectomy to open cholecystectomy.
Study Design: Comparative cross-sectional study.
Place and Duration of Study: Pak Emirates Military Hospital Rawalpindi, from May 2020 to Sep 2021.
Methodology: This study was conducted on 200 patients who underwent laparoscopic cholecystectomy for any benign pathology during the study period. Data was collected for all the patients who required conversion of surgical procedure from laparoscopic to open cholecystectomy. Demographic and clinical risk factors were associated with conversion of procedure in the study participants.
Results: Out of 200 patients included in the final analysis 67 (33.5%) were male and 133 (66.5%) were female. Mean age of patients put who underwent laparoscopic surgery for benign gall bladder pathologies in our study was 43.46 ± 8.337 years. Gall stones were the commonest clinical condition for which laparoscopic cholecystectomy was done. Out of 26 (13%) patients underwent conversion of laparoscopic to open surgery. It was revealed that frozen Calots triangle (*p*-value-0.033), empyema gall bladder (*p*-value-0.018) and previous abdominal surgeries (*p*-value-0.013) were significantly related to conversion of laparoscopic to open surgery
Conclusion: Conversion rate of laparoscopic to open surgery for cholecystectomy was high in our study population. Patients who had previous abdominal surgeries or presence of frozen Calots triangle and empyema gall bladder were more at risk of conversion of surgery.

Keywords: Laparoscopy; Open cholecystectomy; Risk factors.

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INTRODUCTION

Abdominal surgeries have been revolutionized in last two decades across the globe.[1] Minimaaly invasive procedures have replaced a lot of traditional surgical methods but still role of these open methods have not become obsolete.[2] Laparoscopic cholecystectomy have replaced open cholecystectomy in many surgical centers of the world but still a lot of surgeons practice open method for surgical pathologies of gall bladder due to various personal, service related or patient related reasons.[3] Advancement in surgical skills and methods required command on basic skills because sometimes technology may not be answer to all questions especially when a surgeon is stuck in a difficult situation while performing a surgery.[4] There have been interesting statistics regarding conversion of laparoscopic surgeries to open surgeries even in best of the surgical centers around the world.[5] A surgeon should be aware of the fact that a need of this conversion of method of surgery may arise and should be equipped to take this decision in time.[6]

Studies have been done in the recent past to look for the reasons or factors responsible for conversion of laparoscopic procedure to an open one. Kama *et al*. published a study and concluded that inability to define anatomy in patients with inflamed contracted gallbladder, gender, history of previous abdominal scar along with various other factors were associated with conversion of laparoscopic surgery to open surgery in their patients.[7] Warchałowski *et al*, came up with the findings that age of the patient, type of emergency management offered, inflammation of gall bladder and peritoneal involvement determined the conversion of surgical procedure.[8] A monocentric study and review of the literature was carried out by Jarrar *et al*, with the findings that male gender, ulcerative disease, being a smoker, ASA score=II, and perivesicular effusion on ultrasound were significantly associated with conversion of laparoscopic surgery to open surgery.[9]

A recent local study conducted in Islamabad concluded that conversion rate from laparoscopic to open surgery was around 7.78% and deranged liver function tests and multiple stones on ultrasonography

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predicted conversion of surgical procedure from laparoscopic to open type.[10] A series of demographic and clinical factors may be responsible for this conversion and limited local data has been generated in this regard. We therefore planned this study with the rationale to evaluate the various factors leading to conversion of laparoscopic cholecystectomy to open cholecystectomy at Pak Emirates Military Hospital Rawalpindi.

METHODOLOGY

This comparative cross-sectional study was conducted at the surgical department of Pak Emirates Military Hospital (PEMH) Rawalpindi, from May 2020 to September 2021. Sample size was calculated by WHO sample size calculator by using population prevalence proportion of conversion rate of laparoscopic to open surgery as 7.78%.[10] Non probability consecutive sampling technique was used to gather the sample.

Inclusion Criteria: All patients between the age of 18-65 years who underwent laparoscopic management for benign gall bladder pathologies were included in the study. Patients who underwent laparoscopic procedure for benign gall bladder diseases at other hospitals were also included in the analysis in addition to the patients of own hospital.

Exclusion Criteria: Patients with uncontrolled diabetes or hypertension or any other physical illness were excluded. Patients with a known gallbladder carcinoma or any other solid or hematological malignancy were also made part of the exclusion criteria. Those undergoing redo surgeries were also the part of exclusion criteria in this study.

After ethical approval from the ethical review board committee (via letter no: A/28/EC/114/20) and written informed consent from potential participants, patients who were undergoing laparoscopic management of benign gallbladder diseases at surgical unit of PEMH RWP fulfilling the above mentioned inclusion and exclusion criteria were included in the study. Routine analgesia and antibiotic cover was given to each patient as per the hospital protocol and condition of the patient. Laparoscopic cholecystectomy was performed by consultant surgeon via set protocols.[11] Decison of conversion to open cholecystectomy was made by same treating surgeon and open cholecystectomy was then performed via conventional method.[12] Frozen Calots triangle was diagnosed by treating surgeon on the basis of gross examination during the surgery.[13] Empyema of gall bladder was also diagnosed during the surgery by consultant surgeon.[14]

Frequency and percentages for gender, patients undergoing conversion surgery, patients having frozen Calots triangle and empyema gall bladder were calculated. Mean and standard deviation for age was also calculated for the study participants. Pearson chi-square test by keeping the *p*-value <0.05 as significant was used to look for association of various risk factors with conversion of laparoscopic cholecystectomy to open cholecystectomy. Statistical Package for Social Science version 23 was used to carry out the above mentioned analysis.

RESULTS

Out of 200 patients included in the final analysis 67 (33.5%) were male and 133 (66.5%) were female. Mean age of patients put who underwent laparoscopic surgery for benign gall bladder pathologies in our study was 43.46 ± 8.337 years. Table-I summarized the general characteristics of study participants. Gall stones were 135 (67.5%) the commonest clinical condition for which laparoscopic cholecystectomy was done followed by gallbladder polyps 45 (22.5%) and acalculous cholecystitis 15 (7.5%). Out of 26 (13%) patients underwent conversion of laparoscopic to open surgery. Empyema gall balder was present in 18 (9%) patients while this complication was not observed in 182 (91%). There was history of abdominal surgery in 17 (8.5%) while 183 (91.5%) patients never had abdominal surgery in the past.

Table-I: Characteristics of patients undergoing laparoscopic cholecystectomy.

Study Parameters	n (%)
Age (years)	
Mean ± SD	43.46 ± 8.337
Range (min-max)	21-65 years
Gender	
Male	67 (33.5%)
Female	133 (66.5%)
Indications of Laparoscopic Cholecystectomy	
Gall stones	135 (67.5%)
Gall bladder polyps	45 (22.5%)
Acalculous cholecystitis	15 (7.5%)
Others	5 (2.5%)
Conversion to Open Cholecystectomy	
No	174 (87%)
Yes	26 (13%)
Empyema Gall Bladder	
No	182 (91%)
Yes	18 (9%)

Table-II summarized the results of Pearson chi-square test. It was revealed that presence of frozen Calots triangle (*p*-value-0.033), empyema gall bladder (*p*-value-0.018) and previous abdominal surgeries (*p*-

value-0.013) were statistically significantly related to conversion of laparoscopic to open surgery while age (*p*-value-0.827) and gender (*p*-value-0.569) had no such relationship.

Table-II: Association of various factors with conversion of laparoscopic to open cholecystectomy (chi-square test)

Socio Demographic Factors	No Conversion to Open Cholecystectomy	Conversion to Laparoscopic Cholecystectomy	*p*-value
Age (Year)			
50 or less	83 (47.7%)	13 (50%)	0.827
50-65	91 (52.3%)	13 (50%)	
Gender			
Male	57 (32.7%)	10 (38.5%)	0.569
Female	117 (67.3%)	16 (61.5%)	
Fibrosed Calots Triangle			
No	160 (91.9%)	20 (76.9%)	0.033
Yes	14 (8.1%)	6(23.1%)	
Empyema Gall Bladder			
No	162 (93.1%)	20 (76.9%)	0.018
Yes	12 (6.9%)	06 (23.1%)	
Previous Abdominal Surgery			
No	163 (93.7%)	20 (76.9%)	0.013
Yes	11 (6.3%)	06 (23.1%)	

DISCUSSION

Conversion of laparoscopic to open surgery was fairly common finding of our study. Previous abdominal surgeries or presence of frozen Calots triangle and empyema gall bladder were associated with this conversion in our study participants. Conventional open surgery has been replaced by the laparoscopic method for most of the abdominal surgery and gynecological procedures.[3] Many centers of the world have evaluated this method and proved safety and efficacy in various surgeries of abdominal region.[2,3] There could be number of factors preoperatively which could help the treating team decide about the mode of surgery in patients undergoing cholecystectomy. Still there could be number of events or findings during the surgery which could compel the treating surgeon to convert the mode of surgery from laparoscopic to conventional open surgery. We in our study tried to obtain data in this regard at Pak Emirates Military Hospital Rawalpindi.

Laparoscopic surgeries could be difficult and converted to open surgeries in a lot of cases. First step therefore could be evaluation of patient with regard to difficult laparoscopic surgery. A study from Baghdad in 2019 aimed to assess factors associated with difficult laparoscopic cholecystectomy. It was concluded that gender, body mass index and indication of surgery were associated with difficult surgery.[15] We went a step ahead of Basim Gadhban and evaluated the factors related to conversion of laparoscopic cholecystectomy to open cholecystectomy. Our results were slightly different from them as gender was not associated with conversion and we did not include BMI as factor in our analysis.

A world society of emergency surgery prospective collaborative study published by Sugrue *et al*.[16] concluded that G10 operative scores predicted the need to convert laparoscopic cholecystectomy to open cholecystectomy. This score comprised of gross appearance of the organ, level of distension of gall bladder, easy accessibility and the infection in peritoneal lining and cavity. Our findings supported the results of Surgrue *et al*. as presence of frozen Calots triangle and empyema gall bladder were statistically significantly related to laparoscopic surgery being converted to open surgery in our target population.

A systematic review was published in 2017 with an objective similar to our study. They came up with the findings that evidence was quite heterogeneous in this regard and old age and male gender were associated with conversion of surgery. Both these factors had no association in our study but patients with past history of surgery of abdominal region of frozen Calots triangle and empyema gall bladder were more at risk of conversion of surgery.

Nassar *et al*.[18] presented this idea from a newer perspective which is very much relevant to lower and middle income country like ours with lesser number of trained professionals performing laparoscopic cholecystectomy. They came up with very interesting results. They recommended that creating a sub-specialty of laparoscopic surgery and training people in to this would reduce conversion to open procedure as well as mortality related to the procedure.

Complications and risk factors associated with conversion to open procedure in our study could also be prevented if we introduce laparoscopic surgery as a subspecialty and train more individuals in this field. Treating team could also manage the patients with previous abdominal scars at high risk and become more vigilant if per-operatively find frozen calots triangle.

LIMITATION OF STUDY

Study design posed few methodological limitations in our data set. There could be number of physician related, service related, patient related and disease related factors which could be responsible for conver-sion of laparoscopic surgery to open surgery. All of these factors could not be incorporated in one study.

CONCLUSION

Conversion rate of laparoscopic to open surgery for cholecystectomy was high in our study population. Patients

who had previous abdominal surgeries or presence of frozen calots triangle and empyema gall bladder were more at risk of conversion of surgery.

Conflict of Interest: None.

Author's Contribution

MZ: Data collection, manuscript writing, SPSS data analysis, AUDN: Data collection, Manuscript writing, ASM: Manuscript writing, ZS: Data collection, Manuscript writing, FUN: Article review, SPSS data analysis, AR: Article review.

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