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Frequency of Various Factors that Lead to Conversion of Laparoscopic Cholecystectomy to Open Cholecystectomy

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ABSTRACT

Objective: To determine the frequency of various factors that lead to the conversion of laparoscopic cholecystectomy to open cholecystectomy.
Study Design: Prospective longitudinal study.
Place and Duration of Study: Department of General Surgery, Combined Military Hospital Rawalpindi, Pakistan, from Aug 2020 to Aug 2022.
Methodology: One hundred and twenty-four individuals who had symptomatic gallstones and were scheduled to have laparoscopic cholecystectomy were included. For patients in whom laparoscopic surgery was converted to an open procedure, the factors leading to this conversion were assessed.
Results: In our study, median age was 51.00 (70.00–21.00) years, 47(37.90%) males and 77(62.10%) females. Patients with ASA status I comprised 94(75.81%), while those with ASA status II comprised 30(24.19%). The median BMI was 21.50 (17.00–44.00) kg/m². The conversion frequency of laparoscopic cholecystectomy into open cholecystectomy was 13(10.48%). The most common factors that led to this conversion were older age 4(30.77%) and obesity 4(30.77%), followed by male gender 2(15.38%), history of previous abdominal surgery 2(15.38%) and poor condition of gall bladder (GB) prior to surgery 1(7.70%).
Conclusion: The conversion frequency of laparoscopic cholecystectomy into open cholecystectomy was 10.48%. The most common factors that led to this were older age and obesity.

Keywords: Conversion, Cholecystitis, Cholelithiasis, Laparoscopic cholecystectomy.

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INTRODUCTION

Gallstones are a common contributor to abdominal discomfort and are among the most common causes of this symptom. The gold-standard procedure for the treatment of symptomatic cholelithiasis as well as cholecystitis is laparoscopic cholecystectomy which is performed through a minimally invasive approach.[1,2] Despite this, several researchers have reported that the conversion rate from laparoscopic cholecystectomy to open cholecystectomy can be very high and variable. In general, the conversion rate of laparoscopic cholecystectomy to open cholecystectomy ranges from 1% - 15%.[3] However, at the national level, studies have reported that this rate of conversion of laparoscopic cholecystectomy to an open cholecystectomy ranges from 8.77%-27.3% with even higher rates in some other studies.[4] According to the findings of several studies, various factors play a significant role in causing higher conversion rates from laparoscopic cholecystectomy to open cholecystectomy, and their frequencies change with the respective demographic regions.[4]

Studies also show that the more experienced the surgeon, the less likely the conversion to open cholecystectomy is. On the other hand, it is also likely that the more experienced the surgeon, the more likely they will be involved in a complicated surgery; hence, higher conversion rates can occur.[5-7] Another factor is the poor anatomical perception of the Calot's triangle, which may lead to bile duct injury and intra-abdominal bleeding secondary to damaged vasculature, resulting in immediate conversion to open cholecystectomy.[8]

Laparoscopic cholecystectomy is a gold standard procedure since it is a much safer procedure with less frequent complications and a shorter duration of stay at a surgical indoor facility. On the other hand, open cholecystectomy is associated not only with prolonged hospital stay. However, it is also associated with higher rates of complications during the postoperative period, such as injury to the right hepatic artery, injury to the bile duct, portal vein injury, and a higher

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infection rate (intra-abdominal abscess, site infection). Moreover, very little literature is available regarding conversion rates, as well as the frequency of various factors that lead to a conversion from laparoscopic cholecystectomy to open cholecystectomy in our local population. This necessitated the conduct of this study, which aimed to determine the frequency of various factors that led to the requirement of switching from laparoscopic cholecystectomy to open cholecystectomy.

METHODOLOGY

The prospective longitudinal study was conducted at Combined Military Hospital, Rawalpindi, Pakistan from August 2020 to August 2022 after obtaining approval from the Ethical Review Board of Combined Military Hospital (CMH), Rawalpindi (ERB #: 460). The sample size of 124 was calculated using The WHO sample size calculator by assuming the anticipated frequency of conversion of laparoscopic cholecystectomy to open cholecystectomy of 8.8%.[9]

Inclusion Criteria: We included adult patients who were more than 18 years old, who were either male or female, who had symptomatic gallstones, and who were scheduled to undergo laparoscopic cholecystectomy with an ASA status-I and II.

Exclusion Criteria: We excluded patients with ASA status III or above, poorly controlled type 2 diabetes mellitus (HbA1c≥ 7.5%), concomitant severe cardiopulmonary disease, bleeding disorders, and those unfit to undergo general anaesthesia.

The study population was selected by using the non-probability consecutive sampling technique. A written consent, signed by the study participants, was made an essential prerequisite. Once selected, baseline characteristics, including age (in years), gender, ASA status, and body mass index (BMI), were documented. The presence of gallstones was confirmed by performing an ultrasound of the abdomen, which is the first-line and most helpful test for diagnosing cholelithiasis,[10] and was performed by an experienced radiologist. Once included, all the patients explained the procedure they were undergoing, i.e., laparoscopic cholecystectomy. They were also told about the chance that their planned laparoscopic cholecystectomy may get converted into an unplanned open cholecystectomy. A team of senior surgeons performed all surgeries with a minimum of two years of experience. All the surgeries were performed by the standard four-port technique. In the case of conversion to open procedure, the event was documented. Additionally, the factor identified in the patient who experienced this event was also assessed and documented. Factors that we looked for included older age (≥ 65 years), obesity (BMI ≥ 30kg/m^2), male gender, history of previous abdominal surgery, and poor condition of gall bladder (GB) prior to surgery (defined by the presence of either of gallstone located at infundibulum, thickened GB wall, acute cholecystitis, biliary pancreatitis, Mirizzi's syndrome or GB carcinoma).[11,12]

Data was analyzed using Statistical Package for Social Sciences (SPSS) 22.00. The normality of data was checked by using the Shapiro-Wilk test. Age and BMI were not normally distributed and are represented using the median and interquartile range (IQR). Qualitative data (gender, ASA status, conversion of laparoscopic cholecystectomy to open cholecystectomy, and factors) was represented by using percentage and frequency.

RESULTS

A total of 124 patients were included in this study. The median age was 51(21–70) years. There were 47(37.90%) male participants while the remaining 77(62.10%) participants were female. Patients with ASA status-I comprised 94(75.81%), while those with ASA status II comprised 30(24.19%). The median BMI was 21.50(17.00–44.00) kg/m^2. These baseline demographics are summarized in Table.

Table: Baseline Characteristics (n = 124)

Parameters	Median (IQR)
Age	51 (21–70) years
Body Mass Index	21.50 (17.00 –44.00) kg/m^2
Gender	n(%)
Male	41(53.95%)
Female	35(46.05%)
American Society of Anesthesiologists Status	
I	94(75.81%)
II	30(24.19%)

In the present study, it was found that the frequency of patients who underwent conversion from laparoscopic cholecystectomy to open cholecystectomy in the study population was 13(10.48%), while the remaining 111(89.52%) patients had an uneventful laparoscopic cholecystectomy, as depicted in Figure-1. Among patients who had changed laparoscopic cholecystectomy into open cholecystectomy (n=13), most common factor that led to requirement of abandoning laparoscopic cholecystectomy and changing over to open

cholecystectomy was older age 4(30.77%) and obesity 4(30.77%), followed by male gender 2(15.38%), history of previous abdominal surgery 2(15.38%) and poor condition of gall bladder (GB) prior to surgery 1(7.70%). This data is depicted below in Figure-2.

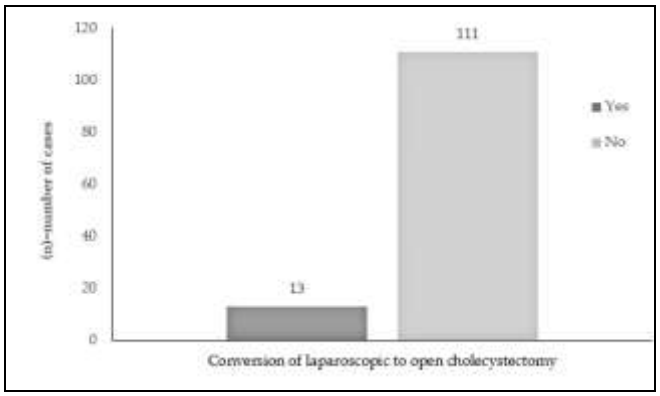

Figure-1: Conversion frequency of Laparoscopic Cholecystectomy into Open Cholecystectomy (n = 124)

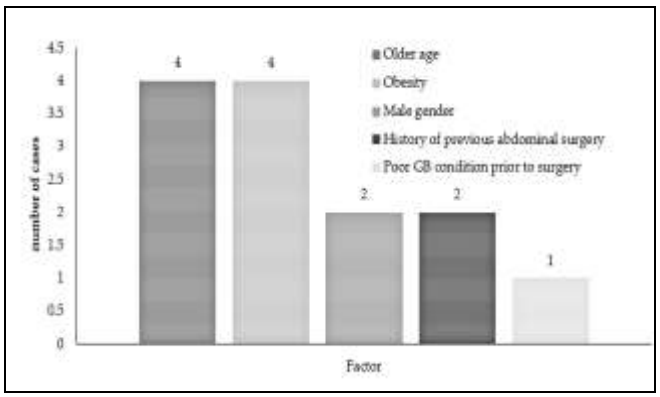

Figure-2: Factors that Led to Conversion of Laparoscopic Cholecystectomy to Open Cholecystectomy (n = 13)

DISCUSSION

Gallstones are the solidified form of bile forming within the gallbladder. The vast majority of individuals afflicted with gallstones remain asymptomatic, although approximately 20% of these patients eventually develop symptoms following a period of presence of asymptomatic gallstones.[13] When symptoms manifest, patients commonly report experiencing discomfort in the upper right quadrant of the abdomen, also known as biliary colic.[14] This pain is typically triggered by consuming meals high in oil or spice content. Definitive treatment of gallstones is the removal of the gallbladder itself through a surgical procedure known as cholecystectomy, which can be done laparoscopically or by an open technique. However, the laparoscopic procedure is not only the procedure of choice but is also associated with much better surgical outcomes and patient prognosis; therefore, it is preferred chiefly over the open procedure.[15,16]

In the present study, most patients with symptomatic gallstones were female. This may be because the frequency of symptomatic cholelithiasis is much higher among women as compared to their male counterparts.[17] It was found that the frequency of conversion of laparoscopic cholecystectomy to open cholecystectomy in the present study population was relatively high. This was significantly higher compared to some previous studies conducted by Yaqub *et al.*[3] and Jadoon *et al.*[18] in the Pakistani population. Similarly, the conversion rate in the Indian population reported in a study conducted by Sharma *et al.*[9] was significantly lower compared to what was found in the present study. Contrarily, Khan *et al.*[4] reported a much higher conversion rate as compared to the present study. In the present study, it was found that the most common factors leading to the conversion from laparoscopic cholecystectomy to open cholecystectomy were older age and obesity. Similar to these findings, Amin *et al.*[19] and Lee *et al.*[20] also reported that older age and obesity independently increase the chances of conversion of laparoscopic cholecystectomy to open cholecystectomy. On the other hand, Sharma *et al.* 9 and Enami *et al.*[21] reported that no association exists between older age and obesity and a higher rate of conversion of laparoscopic cholecystectomy to open cholecystectomy. In addition, male gender, history of previous abdominal surgery, and poor condition of GB prior to surgery were also contributing factors. This was also congruent with the findings of studies conducted by Sapmaz *et al.*[5] and Ercan *et al.*[22]

Based on the present study, some risk factors have been identified that have the potential to cause abandonment of laparoscopic cholecystectomy and a switch to open cholecystectomy. It is strongly recommended that an extensive population study be conducted in this regard to identify other such factors. This will help in planning a comprehensive care package and modified surgical approach to avoid this changing of laparoscopic cholecystectomy into open cholecystectomy.

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CONCLUSION

In conclusion, factors like older age, obesity, male gender, poor condition of gall bladder prior to surgery, and history of previous abdominal surgery have the propensity to increase the rate of conversion of laparoscopic cholecystectomy to open cholecystectomy. Amongst these, older and obesity are more common factors.

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Authors Contribution

Following authors have made substantial contributions to the manuscript as under:

FS & MJ: Conception, study design, drafting the manuscript, approval of the final version to be published.

WU & MSF: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

5,6: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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