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ORIGINAL ARTICLE

Factors Influencing the Transition from Laparoscopic to Open Cholecystectomy: An Exploratory Study

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ABSTRACT:

Background: Gallstones are a common gastrointestinal issue that often requires hospitalization. The preferred surgical method for most patients is laparoscopic cholecystectomy. However, in some cases, the procedure needs to be converted to an open cholecystectomy due to factors like adhesions, complex anatomy at Calot's triangle, or common bile duct injury. This study was conducted in the surgery department of a tertiary care center, with the primary goal of identifying the factors that lead to the conversion from laparoscopic to open cholecystectomy. The secondary objectives included examining the age, gender, and underlying causes of cholelithiasis. **Methods**: In this prospective observational study, a total of 100 patients were enrolled after obtaining informed consent and receiving ethical clearance from the Institutional Review and Research Committee (IRRC). Patients who had been diagnosed with cholelithiasis through various imaging techniques such as ultrasonography (USG), magnetic resonance cholangiopancreatography (MRCP), and endoscopic retrograde cholangiopancreatography (ERCP) were scheduled for laparoscopic cholecystectomy. **Results**: Out of the 100 patients enrolled in this study, 9 of them required conversion from laparoscopic cholecystectomy to an open procedure. The leading cause for conversion was the presence of adhesions, which accounted for the majority at 8%. Other factors contributing to the need for conversion included common bile duct (CBD) injury (2%), bleeding of the cystic artery (2%), bowel injury (1%), and unclear anatomy (3%). **Conclusion**: Laparoscopic cholecystectomy is generally considered a safe and minimally invasive procedure with a low conversion rate. However, this study highlighted that the primary reason for conversion to open cholecystectomy was the presence of dense adhesions in Calot's triangle. This underscores the significance of adhesions as a common factor leading to the need for switching from laparoscopic to open cholecystectomy.

Keywords: Cholelithiasis, Cholecystectomy, Adhesions, Conversion, Calot’s triangle

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INTRODUCTION

Gallstones are a common gastrointestinal condition, affecting 10-20% of the population, although many cases remain asymptomatic. Notably, obesity is a significant risk factor for the development of symptomatic cholelithiasis. Abdominal ultrasound is a valuable tool for diagnosing gallstones. Laparoscopic cholecystectomy, the preferred surgical approach for gallstones, requires general anesthesia and muscle relaxation. However, patients unable to tolerate general anesthesia are contraindicated for this procedure[1]. Assembling a proficient surgical team, including a skilled laparoscopic surgeon, first assistant, and camera operator, is crucial for a successful laparoscopic cholecystectomy. Patients should receive preoperative information, and a thorough assessment of preoperative risk factors should be conducted to estimate the likelihood of conversion to open cholecystectomy. It's important to recognize that converting to open surgery is a proactive measure to prevent complications, and identifying risk factors in advance can be beneficial for both the surgeon and the patient.[2]

Gallstones are a common gastrointestinal condition, affecting a significant portion of the population, although many cases remain asymptomatic. Symptomatic cholelithiasis is a prevalent reason for hospitalization. Obesity has emerged as a notable risk factor for developing symptomatic cholelithiasis, underscoring the importance of early diagnosis and management.[3] Abdominal ultrasound is a highly reliable and precise diagnostic tool for detecting the presence of gallstones. Once symptomatic cholelithiasis is diagnosed, the primary surgical approach is typically laparoscopic cholecystectomy, a minimally invasive procedure.

Laparoscopic cholecystectomy offers numerous advantages, but it requires the administration of general anesthesia and muscle relaxation. It is crucial to ensure that patients can tolerate general anesthesia before proceeding with this surgery. Building a skilled surgical team is the initial and pivotal step towards a successful laparoscopic cholecystectomy[4]. This team should include a highly trained laparoscopic surgeon, a first assistant with equivalent skills, and a camera operator who is well-versed in laparoscopic anatomy and techniques specific to cholecystectomy. Preoperative patient education is also a vital component of this process.

In addition, a thorough assessment of preoperative risk factors is essential. Such an evaluation helps estimate the likelihood of conversion from

laparoscopic to open cholecystectomy. Importantly, the conversion from laparoscopic to open surgery should not be seen as a complication but rather as a proactive measure to prevent complications. By identifying and addressing potential risk factors prior to the procedure, the surgical team can work to minimize the need for conversions, ultimately benefiting both the patient and the surgical outcome. This study aimed to assess the factors associated with the conversion of laparoscopic cholecystectomy to open cholecystectomy, with a specific focus on a tertiary care center setting.

MATERIALS AND METHODS

In this prospective observational study, a cohort of 100 patients who presented with symptomatic gallbladder disease were enrolled to undergo laparoscopic cholecystectomy. The study was conducted after receiving the necessary ethical clearance, and informed consent was diligently obtained from each participating patient prior to their inclusion in the study.

The inclusion criteria for the study were as follows: patients of both genders, aged 20 years and older, who had been diagnosed with gall bladder disease and had willingly agreed to participate in the research. Written informed consent was particularly required from all patients, specifically acknowledging the potential for the conversion of laparoscopic cholecystectomy to open cholecystectomy, in order for them to meet the eligibility criteria for the study[5].

Conversely, there were exclusion criteria applied in the study. Patients exhibiting clinical signs of obstructive jaundice were excluded, as were those with a palpable gall bladder lump. Pregnant females were not included in the study, and individuals with a perforated gall bladder, as well as those diagnosed with gall bladder carcinoma or any other form of malignancy, were also excluded from the study. These exclusion criteria were important to maintain the homogeneity of the study group and ensure that the research focused on patients with a consistent profile of symptomatic gallbladder disease.Patients who displayed clinical features of obstructive jaundice, those with a palpable gall bladder lump, pregnant females, individuals with a perforated gall bladder, and those diagnosed with carcinoma of the gall bladder or any other malignancy were systematically excluded from this study to ensure that the cohort maintained a consistent profile and to focus the research on patients with symptomatic gallbladder disease[6].Each patient involved in the study underwent a comprehensive evaluation, which began with the collection of detailed clinical history and examination of their previous treatment records. Preoperative investigations were conducted, which included a battery of tests such as complete blood count (CBC), bleeding time/coagulation time (BT/CT), random blood sugar (RBS), liver function tests (LFT), renal function tests (RFT), serum amylase, serum lipase, urine analysis, HIV testing, HBsAg, HCV screening, electrocardiogram (ECG), and chest X-ray (PA view).

Additionally, abdominal ultrasound was performed for all patients as a fundamental diagnostic step. In certain cases, further imaging studies, such as magnetic resonance cholangiopancreatography (MRCP) and endoscopic retrograde cholangiopancreatography (ERCP), were conducted to provide a more comprehensive assessment of the gallbladder and surrounding structures[7].The laparoscopic cholecystectomies were conducted under the expertise of a consultant surgeon. Throughout the procedures, operative findings were meticulously documented, and any conversions from laparoscopic to open cholecystectomy were recorded and analyzed for the reasons behind these conversions. Furthermore, the excised gall bladder specimens resulting from the cholecystectomies were systematically sent for histopathological examination to confirm and validate the clinical diagnoses.

RESULTS

Among the 100 cases that underwent laparoscopic cholecystectomy, 56% were males, and 44% were females. When examining gender-wise distribution, it was observed that the incidence of conversion to open cholecystectomy was higher in male patients, accounting for 66%, compared to female patients, where it was 33%. There were nine conversions in total, resulting in a conversion rate of 9%. Among the patients, the majority, comprising 70%, fell into the age group of 30 to 60 years. About 26% of the patients were above 60 years of age, and a smaller percentage, 4%, were under 30 years old[6]. Notably, patients in the age group of 30 to 60 years had a higher conversion rate, which stood at 77%.

Among the 100 patients who participated in the study, the duration of surgery varied as follows: less than 50 minutes for 20% of the patients, 50 to 90 minutes for 56% of the patients, and more than 90 minutes for 34% of the patients. It's noteworthy that the nine patients who required conversion to open surgery had a longer duration of surgery, which subsequently led to an extended post-operative stay.The reasons for conversion to open cholecystectomy in these nine patients were distributed as follows:

- Intraoperative adhesions were the most common cause, identified in 8 patients.
- CBD (common bile duct) injury and bleeding from the cystic artery were each found in 2 patients.
- Bowel injury and unclear anatomy were observed in 1 patient each.
- Additionally, spillage of gallstones was identified in 1 patient as well.

The study's findings provide valuable insights into the factors that contributed to the conversion of laparoscopic cholecystectomy to open cholecystectomy in the patient population under investigation. These factors, including age, duration of

surgery, and the presence of dense adhesions, highlight the importance of careful patient selection and surgical planning in minimizing the need for open conversions and improving the overall safety and success of cholecystectomy procedures[8].

Table 1: Gender wise distribution of cases.

Gender	N	%
Male	56	56
Female	44	44
Total	100	100

Table 2: Age wise distribution of cases.

Age (years)	N	%
<30	4	4
30-60	70	70
>60	26	26
Total	100	100

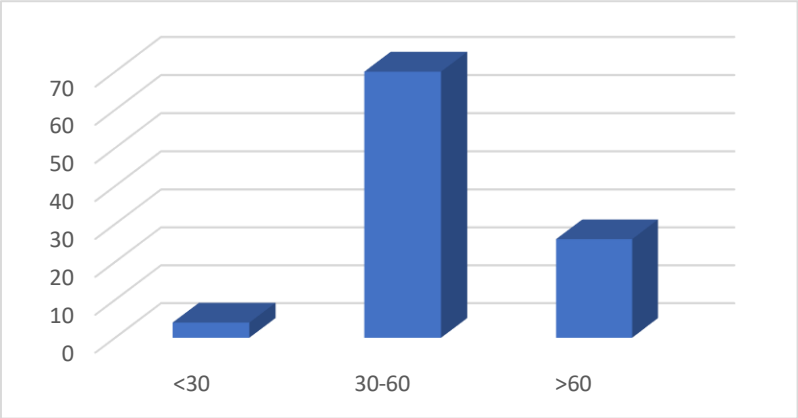
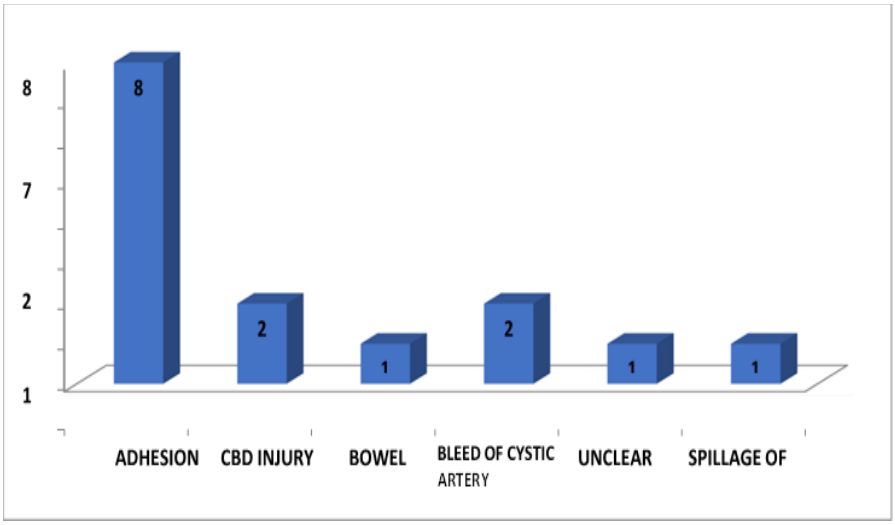


Fig 2: Reasons for conversion



DISCUSSION

Indeed, the gold standard treatment for gall bladder disease is laparoscopic cholecystectomy, and the decision to convert to an open procedure should be viewed as a proactive measure to ensure patient safety and the overall success of the surgical intervention. This approach reflects a commitment to minimizing potential complications and achieving the best possible outcomes for patients undergoing cholecystectomy. Our study included a total of 100 patients, with 56% being males and 44% being females. The gender distribution in our study indicated a higher prevalence of gallstone disease among male patients. Interestingly, our study also observed a higher conversion rate from laparoscopic to open cholecystectomy in male patients compared to females. However, it's essential to note that this

difference in conversion rates did not achieve statistical significance, as the p-value exceeded 0.05.

This observation aligns with the findings from a study conducted by Thyagarajan[9] and colleagues, where they reported a statistically moderately significant association between male gender and the likelihood of conversion (p=0.048). The similarity in findings between our study and the study by Thyagarajan et al. suggests that gender might indeed influence the probability of converting laparoscopic cholecystectomy to open cholecystectomy, even though further investigations are necessary to delve deeper into this association and its underlying factors.

It's intriguing to note that our findings, which indicate a higher conversion rate among male patients, differ from those of Mallik and colleagues, where a higher conversion rate was reported among female patients. This discrepancy highlights the complex and multifactorial nature of the factors influencing the conversion of laparoscopic cholecystectomy to open cholecystectomy, and it underscores the need for further research to gain a more comprehensive understanding of these factors.

Regarding the age distribution in our study, gallbladder disease was observed across a wide age range, with patients as young as 19 years and as old as 85 years undergoing laparoscopic cholecystectomy[10]. However, the majority of patients, constituting 72%, were in the age group of 30 to 60 years. Approximately 24% of patients were aged 60 years and above, with 4% falling below 30 years of age. These findings emphasize the increased prevalence of gallbladder disease in middle-aged and older individuals, consistent with existing data showing that this condition is more common in the fourth, fifth, and sixth decades of life.

CONCLUSION

Absolutely, laparoscopic cholecystectomy is widely recognized as the gold standard for treating gallbladder disease due to its minimally invasive nature and numerous benefits. However, it's essential for healthcare providers and surgeons to understand that the decision to convert from laparoscopic to open cholecystectomy should be guided by sound clinical judgment and the primary goal of ensuring patient safety.Such conversions should not be viewed as surgical failures but as prudent actions taken to minimize potential complications and enhance the overall success of the procedure. Surgeons must be well-prepared and adequately trained to perform open cholecystectomy when required, and ongoing education and skill development in the field are crucial for maintaining high standards of care and ensuring the best possible outcomes for patients. This proactive approach prioritizes patient well-being and surgical success.

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