

Original research article**A Study on factors for conversion from Laproscopic cholecystectomy to open cholecystectomy****¹Dr. Baswesh Patil, ²Dr. Sangamesh Kamthane**^{1,2}Assistant Professor, Department of General Surgery, Mahavir Institute of Medical Sciences, Vikarabad, Telangana, India**Corresponding Author:**
Dr. Sangamesh Kamthane**Abstract**

Background: Gallstones are a prevalent gastrointestinal condition that frequently necessitates hospitalization. The preferred surgical intervention for the majority of patients is laparoscopic cholecystectomy. The main aim of this study was to identify the characteristics that contribute to the conversion from laparoscopic to open cholecystectomy at a tertiary care hospital. The secondary aims of this study were to assess the age, gender, and etiological factors associated with cholelithiasis.

Methods: This study is a prospective observational investigation conducted on a cohort of 90 patients who were admitted to Department of General Surgery, Mahavir Institute of Medical Sciences, Telangana, India between July 2021 to June 2022. Patients identified with cholelithiasis underwent diagnostic procedures such as ultrasonography, magnetic resonance cholangiopancreatography, and/or endoscopic retrograde cholangiopancreatography.

Results: Among the sample of 90 patients, a total of 9 individuals required conversion to open surgery. The most prevalent complications observed in these cases included adhesion, common bile duct injury, bleeding of the cystic artery, bowel injury and the existence of unknown anatomical structures. Subsequently, a laparoscopic cholecystectomy was scheduled. A study was conducted to examine the factors that are linked with the conversion from laparoscopic to open cholecystectomy.

Conclusions: The safety and minimally invasive nature of laparoscopic cholecystectomy make it a widely used method. In this study, the conversion rate was found to be low, and the most frequent reason for conversion was the presence of thick adhesions at Calot's triangle.

Keywords: Adhesions, conversion, cholecystectomy, cholelithiasis and the Calot's triangle

Introduction

Gallstones represent a prevalent gastrointestinal ailment that necessitates hospitalization in a significant number of cases. Gallstones are found in approximately 10-15% of the overall population, with the majority of cases being asymptomatic. Obesity has been recognized as a significant risk factor in the development of symptomatic cholelithiasis. Abdominal ultrasound is a highly valuable and precise modality for the detection of gallstones ^[1-3].

The laparoscopic cholecystectomy procedure has several advantages, including the avoidance of a large incision, less post-operative pain, reduced occurrence of post-operative ileus, faster resumption of oral fluid and food intake, improved cosmetic outcomes, shorter hospital stays for patients, accelerated post-operative recovery, and decreased rates of morbidity and death. The utilization of general anesthesia along with muscular relaxation is necessary in order to carry out a laparoscopic cholecystectomy ^[4]. The contraindication for laparoscopic cholecystectomy is the presence of an inability to tolerate general anesthesia. The utilization of carbon dioxide in the majority of laparoscopic procedures for pneumoperitoneum is associated with several unfavorable physiological consequences, including limited gas exchange capacity and the potential for congestive heart failure. Consequently, recent occurrences of myocardial infarction are regarded as relative contraindications in this context. The user's text is too short to be rewritten academically ^[5]. The team required for a successful laparoscopic cholecystectomy consists of a proficient surgeon specialized in laparoscopy, a first assistant possessing comparable expertise, and a camera operator who possesses a comprehensive understanding of the anatomical structures and technical aspects involved in the procedure ^[6].

To perform the procedure, several essential tools are necessary, including a high-flow carbon dioxide insufflator, four trocars and roughly 10 specialized laparoscopic hand instruments. Following the administration of anesthesia and intubation, it is customary to insert a nasogastric tube to facilitate gastric decompression in patients. The closed or open approach may be employed by the surgeon to get access to the peritoneal cavity and establish pneumoperitoneum, based on their experience and judgement. In the context of medical procedures, the pneumoperitoneum is often achieved by inserting a specialized

needle through the umbilicus. The correct positioning of the needle is verified by allowing saline to flow through it using a plunger-less syringe. Subsequently, the needle is connected to tubing originating from the carbon dioxide insufflator^[7, 8].

A trocar with a diameter of 10 mm is placed through either the supraumbilical or infraumbilical incision. A concise investigation is conducted and supplementary 5-mm ports are inserted in the right anterior axillary line, right midclavicular line and subxiphoid position with direct visualization. In order to expose the porta hepatic, it is necessary to achieve a maximum elevation of both the gallbladder fundus and the liver margin. The removal of the peritoneum covering the gallbladder should expose the anticipated point of insertion of the cystic duct into the gallbladder. The dissection procedure was continued at this particular junction, initially employing a delicate dissector and afterwards with a monopolar L-hook instrument positioned between the cystic duct and cystic artery^[9]. The lymph node of Lund serves as a valuable anatomical reference point for identifying the cystic artery. The visual observation of the liver bed via the gap between the cystic duct and cystic artery, situated above the cystic artery, is commonly referred to as the crucial view of safety^[10].

This approach effectively reduces the potential for unintentional iatrogenic damage to the bile duct. Two clips are positioned on the cystic duct, precisely at its point of connection with the gallbladder, and thereafter, the cystic duct is separated. Two hemostatic clips are strategically positioned on the cystic artery as it traverses the gallbladder, after which the cystic artery is surgically severed^[11]. The aseptic retrieval bag is inserted via either the umbilical or epigastric port, depending on which port has a minimum diameter of 10 mm. In specific situations, there remains a necessity for the conversion from laparoscopic cholecystectomy to open cholecystectomy. It is imperative to provide preoperative information to all patients undergoing laparoscopic cholecystectomy, along with a thorough assessment of preoperative risk factors. This assessment is crucial in determining the likelihood of converting a laparoscopic cholecystectomy to an open cholecystectomy^[12]. The conversion from laparoscopic to open surgery should be considered as a proactive measure to avert difficulties, rather than being classified as a complication itself^[13, 14].

The identification of these risk factors prior to the procedure has the potential to prevent the need for conversion to open cholecystectomy, hence offering benefits to both the surgeon and the patient. The objective of this study was to assess the parameters that are linked to the conversion of laparoscopic cholecystectomy to open cholecystectomy.

Materials and Methods

This study is a prospective observational investigation conducted on a cohort of 90 patients who were admitted to Department of General Surgery, Mahavir Institute of Medical Sciences, Telangana, India between July 2021 to June 2022. Patients identified with cholelithiasis underwent diagnostic procedures such as ultrasonography, magnetic resonance cholangiopancreatography, and/or endoscopic retrograde cholangiopancreatography.

Inclusion criteria

- Gall bladder disease patients of both genders aged 18 and older who were willing to engage in our study and offer written and informed consent for converting laparoscopic to open cholecystectomy were included.

Exclusion criteria

- Obstructive jaundice, visible gall bladder mass, pregnant women, perforated gall bladder, and gall bladder cancer or other malignancies were excluded from investigation.
- Patient refusal of written and informed permission.

A comprehensive clinical history was gathered from all patients, including their past treatment record, followed by a complete clinical examination. A series of preoperative examinations were conducted, encompassing a 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, human immunodeficiency virus (HIV) screening, hepatitis B surface antigen (HBsAg) screening, hepatitis C virus (HCV) screening, electrocardiogram (ECG), and chest X-ray. An abdominal ultrasound was conducted in all instances. Additionally, magnetic resonance cholangiopancreatography and endoscopic retrograde cholangiopancreatography were conducted in certain instances. The laparoscopic cholecystectomies were conducted by the consultant surgeon. The documented operating findings and rationale for conversion were meticulously evaluated. Histopathological evaluation was performed on all specimens of cholecystectomy gall bladders.

Results

Between January 2020 and June 2021, a total of 90 cases underwent the surgical procedure known as laparoscopic cholecystectomy. The gender distribution of the sample was 56% males and 44% females.

The distribution of conversion incidence based on gender revealed a higher prevalence among male patients, with 66% compared to 33% among female patients.

Table 1: Gender distribution

Sr. No.	Gender	N	Percent
1.	Male	50	55.55
2.	Female	40	44.55
3.	Total	90	100

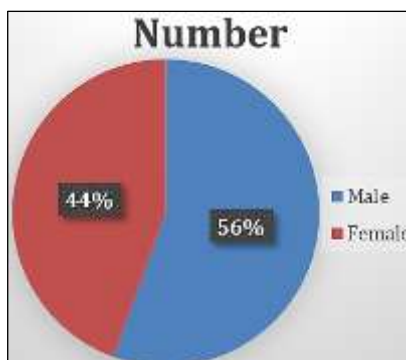


Fig 1: Gender distribution

A total of nine conversions were recorded, resulting in a conversion rate of 9%. The maximum number of patients seen falls within the age range of 30 to 60 years, accounting for 72% of the total. Additionally, 25% of the patients were found to be beyond 60 years old, while 3% of the patients were below 30 years old. The conversion rate among patients aged between 30 and 60 years was found to be 77%. Among the entire cohort of 90 patients, it was observed that the surgical procedures lasted for less than 59 minutes in 10% of the patients, between 60 and 90 minutes in 54% of the patients, and exceeded 90 minutes in 36% of the patients. A total of nine patients who had conversion to open surgery experienced prolonged surgical duration and an extended post-operative hospital stay. The causes of conversions are allocated as follows: Among the cohort of 9 patients who underwent conversion, the prevailing cause for conversion was identified as intraoperative adhesions, which was observed in 8 patients. Two patients each exhibited CBD damage and bleeding originating from the cystic artery. There was a single occurrence of intestinal damage and uncertain anatomical conditions, as well as the release of gallstones, in each patient.

Table 2: Age Distribution

Sr. No.	Age	N	Percent
1.	<30	2	2.22
2.	30-60	68	75.55
3.	>60	20	22.22
4.	Total	90	100

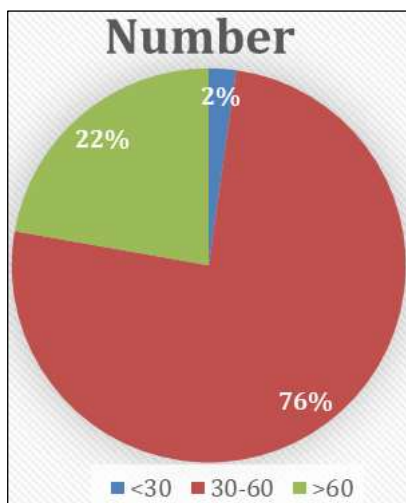


Fig 2: Age Distribution

Discussion

The preferred method of treatment for gall bladder disease is laparoscopic cholecystectomy, which has become widely accepted as the most effective and reliable therapeutic option. The conversion of a laparoscopy to an open method is not indicative of failure, but rather a strategic measure aimed at preventing problems. In the present study, a significant proportion of the patient population consisted of males, accounting for the bulk of the total sample size of 90 patients. The remaining participants were identified as females. Our study revealed a greater prevalence of gallstone disease among male patients. The sex ratio observed in our study was 1.36 males for every 1 female. In the present study, a total of 9 individuals underwent a conversion to open surgery, with 6 of these patients being male and 3 being female. In our research, it was seen that male patients exhibited a higher rate of conversion in comparison to female patients. However, it is important to note that this difference did not reach statistical significance [12-14].

In the study conducted by Thyagarajan *et al.*, it was observed that the conversion rate differed between male and female populations, with rates of 17.67% and 5.64% respectively. The statistical analysis revealed a p-value of 0.048, indicating a moderate level of statistical significance for this component. This finding contrasts with the study conducted by Mallik *et al.*, in which they observed a higher prevalence of conversion rate among females. Among the 70 patients that underwent conversion, 18 were identified as male while the remaining 94 were identified as female, resulting in a male-to-female ratio of approximately 1:5. Al Ghadhban *et al.*, conducted a study that examined individuals receiving laparoscopic cholecystectomy in comparison to open cholecystectomy. Their findings revealed a higher rate of conversion in female patients as opposed to male patients, with the specific percentage not provided [15-17].

Gallbladder disease is not limited to any specific age group; nevertheless, it appears to be more prevalent among individuals in their fourth, fifth, and sixth decades of life, as seen by 72% of reported cases falling within these age ranges. In the present study, the lower age limit for patients undergoing laparoscopic cholecystectomy was 19 years, while the upper age limit was 83 years. The study found that a significant proportion of the patient population, specifically 72%, was within the age range of 30-60 years. Additionally, 25% of patients were aged 60 years and above, while the remaining 3% were under the age of 30 [18-21].

In the present study, it was observed that among the total of 9 patients who underwent conversion to the open technique, 7 patients belonged to the age group of 30-60 years, while 2 patients were above the age of 60 years. Notably, no patients below the age of 30 years were included in the study. The statistical analysis revealed that there was no significant difference in the observed outcomes, as indicated by the non-significant. The primary factor contributing to conversion appears to be the prevalence of gallbladder disease and fibrotic adhesions in those aged 60 and above. Multiple studies have shown that elderly individuals experience heightened conversion rates as a result of recurring episodes of cholecystitis and consequences stemming from metabolic decompensation. In their study, Awan *et al.* discovered that the proportion of patients requiring conversion to open cholecystectomy was 10.3% among individuals aged 60 years and above, and 4.7% among those below the age of 60 years. The study conducted by Reddy *et al.* yielded the finding that patients aged 60 years and above had a higher rate of conversion in comparison to those below the age of 60. This observation indicates that age might be considered as a risk factor for conversion [22-24].

In our study, it was observed that out of a total of nine patients who underwent laparoscopic cholecystectomy, eight patients exhibited the presence of adhesions and subsequently required conversion to open cholecystectomy. In our study, a total of 90 patients were included. The duration of surgery was found to be less than 59 minutes in 10 patients, between 60 and 90 minutes in 50 patients, and more than 90 minutes in 40 patients. The study findings revealed that patients who underwent conversions experienced a higher mean duration of surgery compared to those who did not undergo conversions. The statistical analysis revealed a significant connection, as shown by a p-value of less than 0.006. In a study conducted by Dalal *et al.*, it was observed that the average duration of operation for converted patients was 128 minutes, while for successful laparoscopic cholecystectomy it was 48.3 minutes. In a similar vein, Santhanalakshmi and colleagues discovered that the mean time of surgery in their investigation was 75 minutes. Specifically, the mean duration of surgery in instances that required conversion to laparoscopic surgery was found to be 101.2 minutes, while for successful laparoscopic surgeries, the mean duration was 79.4 minutes [25-28].

Conclusion

Laparoscopic cholecystectomy remains the widely accepted and preferred surgical technique for performing cholecystectomy, often regarded as the 'gold standard' treatment. The decision to convert from laparoscopic to open cholecystectomy should be made based on the surgeon's prudent clinical judgment, rather than being influenced by a deficiency in individual competence. The perception of this process should not be framed as a failure, but rather as an indispensable measure aimed at enhancing patient safety and increasing the probability of a favorable outcome. It is imperative to allocate sufficient

focus towards the training and acquisition of proper skills for surgeons to effectively execute open cholecystectomy.

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