ORIGINAL RESEARCH

To study the circumstances that need the change of laparoscopic cholecystectomy to open cholecystectomy

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ABSTRACT

Aim: To study the circumstances that need the change of laparoscopic cholecystectomy to open cholecystectomy. **Material and methods:** Patients were categorized into two groups: Group 1, which included patients who underwent successful laparoscopic cholecystectomy (n=50), and Group 2, which included patients who required conversion to open cholecystectomy (n=10).A comprehensive clinical history and previous treatment records were obtained for all patients. A thorough clinical examination was conducted. Preoperative investigations included Complete Blood Count (CBC), Bleeding Time (BT) and Clotting Time (CT), Random Blood Sugar (RBS), Liver Function Tests (LFT), Renal Function Tests (RFT), serum amylase and lipase, urine routine examination, HIV, HBsAg, and HCV screening, Electrocardiogram (ECG), and Chest X-ray (PA view). All patients underwent an abdominal ultrasound, and selected cases also underwent Magnetic Resonance Cholangiopancreatography (MRCP) and Endoscopic Retrograde Cholangiopancreatography (ERCP). **Results:** Intraoperative findings highlighted several reasons for conversion to open cholecystectomy. Intraoperative complications were the most common reason, accounting for 40% of conversions. Difficult anatomy was the second most common reason, leading to conversion in 30% of cases. Severe adhesions were responsible for 20% of conversions, while unexpected findings, such as malignancy, accounted for 10% of conversions. These findings underscore the importance of intraoperative challenges in determining the need for conversion.Postoperative outcomes demonstrated significant differences between the two groups. The mean duration of surgery was significantly longer for the open cholecystectomy group (85.7 minutes) compared to the laparoscopic group (65.2 minutes), with a p-value of 0.001, indicating a statistically significant difference. Similarly, the length of hospital stay was significantly longer for the open cholecystectomy group, averaging 5.8 days compared to 3.2 days for the laparoscopic group, with a p-value of 0.002. Postoperative complications were more frequent in the open cholecystectomy group (30%) compared to the laparoscopic group (10%), with a p-value of 0.04. **Conclusion:** The 'gold standard' procedure for cholecystectomy is still laparoscopic cholecystectomy. Conversion from laparoscopic to open cholecystectomy should be based onthe surgeon's sound clinical judgement, not on a lack ofindividual expertise. It should not be viewed as a failure,butratherasanecessary procedurethatwillimprovepatient safety and the likelihood of a positive outcome.

Keywords: Cholelithiasis, Cholecystectomy, Adhesions, Conversion

INTRODUCTION

Laparoscopic cholecystectomy has become the gold standard for the surgical treatment of symptomatic gallbladder disease, such as cholelithiasis and cholecystitis, due to its minimally invasive nature, reduced postoperative pain, shorter hospital stays, and faster recovery times compared to open cholecystectomy. However, despite these advantages, there are instances where laparoscopic cholecystectomy needs to be converted to open cholecystectomy. This conversion is necessitated by various intraoperative challenges and patient-related factors that compromise the safety and effectiveness of the laparoscopic approach.[1]One of the primary reasons for conversion is the presence of difficult anatomy, which can pose significant challenges in visualizing and accessing the gallbladder and associated structures. In some patients, anatomical variations such as a low-lying cystic duct, an aberrant bile duct, or an unusually large or intrahepatic gallbladder can make laparoscopic dissection hazardous. The risk of injury to the common bile duct

or hepatic artery is significantly increased in these cases, necessitating conversion to open surgery to allow for better visualization and safer dissection.[2]Severe adhesions, often resulting from previous abdominal surgeries or chronic inflammation, are another major factor necessitating conversion. Adhesions can obscure critical anatomical landmarks and make the dissection of the gallbladder from surrounding tissues difficult and dangerous. These adhesions not only increase the complexity of the procedure but also the risk of inadvertent injury to the bile ducts, blood vessels, or intestines. In such scenarios, converting to open cholecystectomy provides the surgeon with a more extensive view and greater ability to safely manage adhesions.[3] Intraoperative complications, such as uncontrolled bleeding, bile duct injury, or gallbladder perforation with spillage of bile and stones, also prompt conversion. Bleeding can occur from the cystic artery, liver bed, or other vascular structures and may be difficult to control laparoscopically due to limited space and visibility. Similarly, bile duct injuries, though rare, are serious complications that require immediate conversion to prevent further damage and facilitate repair. Gallbladder perforation can lead to contamination of the peritoneal cavity, increasing the risk of infection and necessitating conversion to ensure thorough cleaning and management of the perforation site.[4]Unexpected pathological findings, such as gallbladder cancer or severe inflammation indicative of acute cholecystitis, are also significant reasons for conversion. In cases where malignancy is suspected or confirmed intraoperatively, an open approach allows for a more extensive resection and proper oncological management, including lymph node dissection and wider margins. Acute inflammation, often characterized by a thickened gallbladder wall and surrounding tissue edema, can obscure normal anatomy and make laparoscopic dissection more challenging and risky. Conversion in these cases ensures that the inflamed and friable tissues are handled more safely, reducing the risk of complications.[5]Patient-related factors, such as obesity, can complicate laparoscopic cholecystectomy and increase the likelihood of conversion. Obesity can lead to increased intra-abdominal fat, which can obscure the surgical field and make access to the gallbladder more difficult. Additionally, obese patients may have associated comorbidities, such as cardiovascular or respiratory issues, which can complicate anesthesia management and prolong the operative time, necessitating conversion for patient safety.Intraoperative assessment plays a critical role in the decision to convert to open cholecystectomy. Surgeons must continuously evaluate the progress of the procedure, the clarity of anatomical landmarks, and the patient's stability. When the risks of continuing laparoscopically outweigh the benefits, timely conversion is essential to ensure patient safety and optimal surgical outcomes. This decision is often based on the surgeon's experience, judgment, and intraoperative findings.[6]The conversion rate from laparoscopic to open cholecystectomy varies in the literature, typically ranging from 2% to 15%, depending on the study population and the definition of conversion criteria. Factors such as the surgeon's experience, patient selection, and preoperative imaging can influence this rate. Preoperative imaging, including ultrasound and magnetic resonance cholangiopancreatography (MRCP), can help identify patients at higher risk for conversion by providing detailed information about gallbladder anatomy and the presence of gallstones or other pathologies.[7]

MATERIALS AND METHODS

This prospective observational study was conducted on 60 admitted patients diagnosed with symptomatic gallbladder disease and scheduled for laparoscopic cholecystectomy. Ethical clearance was obtained from the institutional review board, and written informed consent was secured from all participants. The study population included patients of both genders aged 18 years and above who had gallbladder disease and were willing to participate. Patients also consented to the possibility of conversion from laparoscopic to open cholecystectomy if necessary.The inclusion criteria were patients aged 18 years and above with symptomatic gallbladder disease and those willing to participate in the study and provide written informed consent for potential conversion to open cholecystectomy. Exclusion criteria included clinical features of obstructive jaundice, palpable gallbladder lump, pregnant females, perforated gallbladder, carcinoma of the gallbladder or any other malignancy, and those refusing to provide written informed consent.

Methodology

Patients were categorized into two groups: Group 1, which included patients who underwent successful laparoscopic cholecystectomy (n=50), and Group 2, which included patients who required conversion to open cholecystectomy (n=10).A comprehensive clinical history and previous treatment records were obtained for all patients. A thorough clinical examination was conducted. Preoperative investigations included Complete Blood Count (CBC), Bleeding Time (BT) and Clotting Time (CT), Random Blood Sugar (RBS), Liver Function Tests (LFT), Renal Function Tests (RFT), serum amylase and lipase, urine routine examination, HIV, HBsAg, and HCV screening, Electrocardiogram (ECG), and Chest X-ray (PA view). All patients underwent an abdominal ultrasound, and selected cases also underwent Magnetic Resonance Cholangiopancreatography (MRCP) and Endoscopic Retrograde Cholangiopancreatography (ERCP). Laparoscopic cholecystectomy was performed by a consultant surgeon. The operative findings and reasons for conversion to open cholecystectomy were

meticulously recorded. Indications for conversion included intraoperative complications, difficult anatomy, severe adhesions, and unexpected findings such as malignancy. All gallbladder specimens were sent for histopathological examination.Postoperative parameters such as duration of surgery and length of hospital stay were documented for both groups. Patients were monitored for complications and overall recovery.

Statistical Analysis

Descriptive statistical analysis was performed using mean and standard deviation. Data were analyzed using SPSS software version 25.0. Continuous variables were expressed as mean ± standard deviation (SD), and categorical variables were presented as percentages. Differences between groups were assessed using appropriate statistical tests, with a p-value of less than 0.05 considered statistically significant.

RESULTS

Table 1: Demographic Data

The demographic data indicated no significant differences between the patients who underwent successful laparoscopic cholecystectomy and those who required conversion to open cholecystectomy. The mean age of patients in the laparoscopic group was 45.3 years, compared to 47.8 years in the open cholecystectomy group, with a p-value of 0.45, indicating no statistical significance. Gender distribution was also similar between the two groups, with 44% males and 56% females in the laparoscopic group, and 60% males and 40% females in the open conversion group, both with a p-value of 0.35. This suggests that age and gender were not significant factors in determining the need for conversion.

Table 2: Preoperative Laboratory Parameters

Preoperative laboratory parameters showed no significant differences between the two groups. The mean hemoglobin level was 12.8 g/dL in the laparoscopic group and 12.5 g/dL in the open conversion group, with a p-value of 0.57. The white blood cell count averaged 7.2 ×10^9/L in the laparoscopic group and 7.8 ×10^9/L in the open group, with a p-value of 0.34. Serum bilirubin levels were 1.0 mg/dL in the laparoscopic group and 1.1 mg/dL in the open group, with a p-value of 0.58. Serum amylase levels were 70.3 U/L in the laparoscopic group and 72.5 U/L in the open group, with a p-value of 0.70, while serum lipase levels were 30.2 U/L and 32.8 U/L, respectively, with a p-value of 0.42. These results indicate that preoperative blood tests did not significantly predict the need for conversion to open surgery.

Table 3: Intraoperative Findings and Reasons for Conversion

Intraoperative findings highlighted several reasons for conversion to open cholecystectomy. Intraoperative complications were the most common reason, accounting for 40% of conversions. Difficult anatomy was the second most common reason, leading to conversion in 30% of cases. Severe adhesions were responsible for 20% of conversions, while unexpected findings, such as malignancy, accounted for 10% of conversions. These findings underscore the importance of intraoperative challenges in determining the need for conversion.

Table 4: Postoperative Outcomes

Postoperative outcomes demonstrated significant differences between the two groups. The mean duration of surgery was significantly longer for the open cholecystectomy group (85.7 minutes) compared to the laparoscopic group (65.2 minutes), with a p-value of 0.001, indicating a statistically significant difference. Similarly, the length of hospital stay was significantly longer for the open cholecystectomy group, averaging 5.8 days compared to 3.2 days for the laparoscopic group, with a p-value of 0.002. Postoperative complications were more frequent in the open cholecystectomy group (30%) compared to the laparoscopic group (10%), with a p-value of 0.04. These results highlight the increased morbidity associated with conversion to open surgery, including longer operative times, extended hospital stays, and higher complication rates.

Table 1: Demographic Data

Variable	Laparoscopic Cholecystectomy (n=50)	Open Cholecystectomy (n=10)	p-value
Age (years)	45.3 ± 12.5	47.8 ± 11.2	0.45
Male (%)	22 (44%)	6 (60%)	0.35
Female (%)	28 (56%)	4 (40%)	0.35

Table 2: Preoperative Laboratory Parameters

Parameter	Laparoscopic Cholecystectomy (Mean ± SD)	Open Cholecystectomy (Mean ± SD)	p-value
Hemoglobin (g/dL)	12.8 ± 1.5	12.5 ± 1.6	0.57
White Blood Cell Count (×10^9/L)	7.2 ± 1.8	7.8 ± 2.0	0.34
Serum Bilirubin (mg/dL)	1.0 ± 0.3	1.1 ± 0.4	0.58
Serum Amylase (U/L)	70.3 ± 20.1	72.5 ± 22.3	0.70
Serum Lipase (U/L)	30.2 ± 10.5	32.8 ± 11.2	0.42

Table 3: Intraoperative Findings and Reasons for Conversion

Reason for Conversion	Frequency (n=10)	Percentage (%)
Intraoperative Complications	4	40%
Difficult Anatomy	3	30%
Severe Adhesions	2	20%
Unexpected Findings (e.g., Malignancy)	1	10%

Table 4: Postoperative Outcomes

Outcome	Laparoscopic Cholecystectomy (Mean ± SD)	Open Cholecystectomy (Mean ± SD)	p-value
Duration of Surgery (minutes)	65.2 ± 15.3	85.7 ± 20.5	0.001*
Length of Hospital Stay (days)	3.2 ± 1.0	5.8 ± 2.1	0.002*
Postoperative Complications (%)	5 (10%)	3 (30%)	0.04*

DISCUSSION

The demographic data indicated no significant differences between patients who underwent successful laparoscopic cholecystectomy and those who required conversion to open cholecystectomy. The mean age of patients in both groups was comparable (45.3 years for laparoscopic vs. 47.8 years for open, p=0.45). Gender distribution was also similar (44% males and 56% females in laparoscopic vs. 60% males and 40% females in open, p=0.35). This finding is consistent with other studies which suggest that age and gender alone are not significant predictors for conversion from laparoscopic to open cholecystectomy. For instance, a study by Yetkin et al. (2021) also found no significant correlation between patient demographics and the likelihood of conversion.[3]The preoperative laboratory parameters, including hemoglobin levels, white blood cell counts, serum bilirubin, serum amylase, and serum lipase, showed no significant differences between the groups. This suggests that routine preoperative blood tests are not reliable predictors for the conversion to open cholecystectomy. This aligns with findings from a study by van Dijk et al. (2020), which reported that common laboratory tests did not significantly differ between patients undergoing laparoscopic cholecystectomy and those requiring conversion .[1] Similarly, a review by Suurmeijer et al. (2021) indicated that while elevated inflammatory markers might be observed, they do not provide definitive predictive value for surgical conversion.[3]Intraoperative findings highlighted several key reasons for conversion to open cholecystectomy. Intraoperative complications were the most common reason (40%), followed by difficult anatomy (30%), severe adhesions (20%), and unexpected findings such as malignancy (10%). These results are consistent with numerous studies which have identified similar factors. A meta-analysis by Giger et al. (2020) found that difficult anatomy, such as a severely inflamed gallbladder or adhesions from previous surgeries, and intraoperative complications, such as bleeding or bile duct injuries, are primary reasons for conversion .[4] Moreover, unexpected pathological findings, including malignancies, are less common but significant reasons for conversion, as noted by Sakpal et al. (2021).[5]

Postoperative outcomes showed significant differences between the laparoscopic and open cholecystectomy groups. The duration of surgery was significantly longer for the open group (85.7 minutes vs. 65.2 minutes, p=0.001), and the length of hospital stay was also longer (5.8 days vs. 3.2 days, p=0.002). Postoperative complications were more frequent in the open cholecystectomy group (30% vs. 10%, p=0.04). These results highlight the increased morbidity associated with conversion to open surgery. Studies by Brunt et al. (2022) and Törnqvist et al. (2020) support these findings, indicating that conversions to open cholecystectomy are associated with longer operative times, extended hospital stays, and higher rates of postoperative complications, primarily due to the more complex nature of the cases requiring conversion .[6-10]

CONCLUSION

The 'gold standard' procedure for cholecystectomy is still laparoscopic cholecystectomy. Conversion from laparoscopic to open cholecystectomy should be based onthe surgeon's sound clinical judgement, not on a lack of individual expertise. It should not be viewed as a failure, but rather as a necessary procedure that will improve patient safety and the likelihood of a positive outcome.Surgeons should also be given adequate attention in terms of training and learning ppropriate techniques for performing open cholecystectomy.

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