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Original Research Article

A PROSPECTIVE STUDY TO PREDICT DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY FROM PREOPERATIVE CLINICAL AND RADIOLOGICAL PARAMETERS

Eswaramoorthy. T[1], Premkumar. D[2], Divya. N[3], Cowshik. E[4]

[1]*Senior Resident, Department of General Surgery, Government Medical College Hospital Tiruppur, India.*
[2]*Assistant professor, Department of General Surgery, Government Medical College Hospital Tiruppur, India.*
[3]*Senior Resident, Department of General Surgery, Government Medical College Hospital Tiruppur, India.*
[4]*Assistant Professor, Department of Community Medicine, Government Medical College Tiruppur, India.*

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Corresponding Author:
Dr. Cowshik. E,
Assistant Professor, Department of Community Medicine, Government Medical College Tiruppur, India.
Email: cowshik.esswaran@gmail.com

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ABSTRACT

Background: Laparoscopic cholecystectomy is the standard treatment for cholelithiasis; however, intraoperative difficulty remains a concern in a subset of patients. Preoperative identification of factors predicting difficult laparoscopic cholecystectomy can aid in surgical planning and improve outcomes. **Materials and Methods:** This prospective observational study was conducted in the Department of General Surgery, Government Rajaji Hospital, Madurai, over a period of one year. A total of 40 patients diagnosed with cholelithiasis and undergoing laparoscopic cholecystectomy were included. Preoperative clinical parameters such as age, sex, body mass index (BMI), history of acute cholecystitis, and previous abdominal surgery were recorded. Radiological assessment using ultrasonography and MRCP evaluated gall bladder wall thickness, pericholecystic fluid, number of gallstones, liver parenchyma, and signal intensity patterns. Intraoperative difficulty was assessed based on access, dissection, extraction, bleeding, and conversion to open surgery. Statistical analysis was performed using appropriate tests, with $p < 0.05$ considered significant.

Results: Difficulty in laparoscopic cholecystectomy was significantly associated with higher BMI ($p < 0.001$) and history of acute cholecystitis ($p = 0.001$). Radiological predictors included gall bladder wall thickness ≥3 mm ($p = 0.013$), pericholecystic fluid ($p < 0.001$), MRCP low signal intensity ($p = 0.009$), and liver fibrosis ($p < 0.001$). Conversion to open surgery occurred in 10% of cases.

Conclusion: Preoperative clinical and radiological parameters are reliable predictors of difficult laparoscopic cholecystectomy. Their routine assessment can facilitate better surgical preparedness and reduce intraoperative complications.

Keywords: Laparoscopic cholecystectomy, Difficult cholecystectomy, Gall bladder wall thickness, Pericholecystic fluid, Body mass index.

INTRODUCTION

Laparoscopic cholecystectomy is widely accepted as the standard surgical procedure for the management of gallstone disease due to its advantages of minimal invasiveness, reduced postoperative pain, shorter hospital stays and faster recovery.[1] Despite these benefits, the procedure is not always straightforward and may present significant technical challenges in certain patients.[2] These difficulties can lead to prolonged operative time, increased risk of complications, and occasional conversion to open surgery, thereby affecting overall surgical outcomes.[3]

The concept of a "difficult laparoscopic cholecystectomy" encompasses various

intraoperative challenges such as difficulty in gaining access to the peritoneal cavity, dense adhesions, unclear anatomy in Calot's triangle, difficulty in gall bladder bed dissection, excessive bleeding, and challenges in extraction of the gall bladder.[4] These difficulties are often a result of underlying inflammatory changes, fibrosis, or altered anatomy, which may not be fully appreciated during routine preoperative evaluation.[5]

Preoperative identification of patients who are likely to have a difficult laparoscopic cholecystectomy is of great clinical importance.[6] Accurate prediction allows the surgeon to plan the procedure more effectively, allocate experienced personnel, anticipate possible complications, and counsel patients appropriately regarding the risks, including the possibility of conversion to open surgery.[7] This proactive approach contributes to improved patient safety and better perioperative outcomes.[8]

Clinical parameters play a significant role in predicting operative difficulty.[9] Factors such as increased body mass index, prior episodes of acute cholecystitis, and previous abdominal surgeries are known to influence the complexity of the procedure.[10] These factors may contribute to altered anatomy, adhesions, or increased technical difficulty during access and dissection, thereby impacting the ease of laparoscopic intervention.[11]

Radiological assessment forms an integral part of the preoperative workup and provides valuable information regarding the structural and inflammatory status of the gall bladder and surrounding tissues.[12] Ultrasonographic findings such as increased gall bladder wall thickness, presence of pericholecystic fluid, and multiple gallstones often indicate chronic or acute inflammatory changes.[13] Additionally, advanced imaging modalities like MRCP offer further insight into gall bladder wall characteristics and biliary anatomy, which may help in anticipating surgical challenges.[14-16]

In view of the potential impact of both clinical and radiological factors on operative difficulty, a comprehensive preoperative evaluation is essential. The present study was undertaken to assess the association between selected clinical and radiological parameters and intraoperative difficulty in laparoscopic cholecystectomy, with the aim of identifying reliable predictors that can aid in better surgical planning and improved patient outcomes in a tertiary care setting.

Aims and Objectives

Aim

To evaluate the role of preoperative clinical and radiological parameters in predicting intraoperative difficulty during laparoscopic cholecystectomy in patients with cholelithiasis.

Objectives

- To assess the association between preoperative clinical parameters—specifically body mass index, history of acute cholecystitis, and previous abdominal surgery—and intraoperative difficulty encountered during laparoscopic cholecystectomy.
- To determine the predictive value of radiological parameters, including gall bladder wall thickness, pericholecystic fluid collection, MRCP signal intensity, and liver parenchymal status, in identifying difficult laparoscopic cholecystectomy and related intraoperative complications.

MATERIALS AND METHODS

Study Design and Setting

This was a prospective observational study conducted in the Department of General Surgery, Government Rajaji Hospital, Madurai Medical College, Madurai. The study was designed to evaluate preoperative clinical and radiological parameters as predictors of intraoperative difficulty in patients undergoing laparoscopic cholecystectomy for cholelithiasis.

Study Population

The study population included all patients diagnosed with symptomatic or asymptomatic cholelithiasis who were planned for laparoscopic cholecystectomy during the study period. Both male and female patients aged above 18 years were included after obtaining informed consent.

Study Duration

The study was conducted over a period of one year.

Inclusion and Exclusion Criteria

Inclusion Criteria:

- Patients aged >18 years
- Patients of either gender
- Patients diagnosed with cholelithiasis (symptomatic or asymptomatic) based on clinical and radiological evaluation (ultrasonography and MRCP)
- Patients who consented to participate in the study

Exclusion Criteria

- Patients aged <18 years
- Patients with choledocholithiasis requiring CBD exploration
- Patients unfit for general anesthesia
- Patients with bleeding diathesis
- Patients who did not provide consent for participation

Sample Size and Sampling Technique

A total of 40 patients fulfilling the inclusion criteria were enrolled in the study. A consecutive sampling technique was used, wherein all eligible patients admitted during the study period were included until the desired sample size was achieved.

Study Procedure

Patients presenting with symptoms suggestive of gallstone disease such as upper abdominal pain, vomiting, or dyspepsia were evaluated in detail. A structured proforma was used to collect demographic and clinical data, including age, sex, body mass index

(BMI), history of acute cholecystitis, and previous abdominal surgery.

Routine laboratory investigations including complete blood count, renal function tests, liver function tests, and coagulation profile (PT-INR) were performed. All patients underwent abdominal ultrasonography and MRCP for radiological assessment.

Ultrasonographic parameters included gall bladder wall thickness, presence of pericholecystic fluid, number of gallstones, and liver parenchymal status. MRCP findings included gall bladder wall signal intensity patterns classified as high, intermediate, or low signal intensity.

All patients subsequently underwent laparoscopic cholecystectomy. Intraoperative parameters assessed included access to the peritoneal cavity, difficulty in gall bladder bed dissection, extraction of gall bladder, intraoperative bleeding, and conversion to open surgery.

Operational Definitions

- **Difficult Laparoscopic Cholecystectomy:** Defined based on intraoperative findings such as difficult access to the peritoneal cavity, difficult dissection of the gall bladder bed, excessive bleeding, difficult extraction, or conversion to open surgery.
- **Obesity:** Defined as BMI ≥30 kg/m².
- **Gall Bladder Wall Thickening:** Wall thickness ≥3 mm on ultrasonography.
- **Pericholecystic Fluid Collection:** Presence of fluid around the gall bladder on ultrasonography.
- **MRCP Signal Intensity:** Classified as high, intermediate, or low signal intensity based on gall bladder wall characteristics.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) software version 26. Descriptive statistics were expressed as frequency and percentage for categorical variables. Associations between categorical variables and intraoperative difficulty were analyzed using the Chi-square test or Fisher's exact test as appropriate. A p-value of <0.05 was considered statistically significant.

Ethical Consideration

The study was approved by the Institutional Ethics Committee of Madurai Medical College and Government Rajaji Hospital, Madurai. Informed written consent was obtained from all participants prior to enrollment. Confidentiality of patient data was strictly maintained, and the study was conducted in accordance with ethical principles laid down in the Declaration of Helsinki.

RESULTS

Table 1: Baseline Demographic and Clinical Characteristics of Study Participants (N = 40)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	<30	8	20.0
	31–40	9	22.5
	41–50	9	22.5
	>51	14	35.0
Sex	Male	12	30.0
	Female	28	70.0
History of Acute Cholecystitis	Present	11	27.5
	Absent	29	72.5
Previous Abdominal Surgery	Present	3	7.5
	Absent	37	92.5
Body Mass Index (BMI)	Normal weight	6	15.0
	Overweight	26	65.0
	Obese	8	20.0

The baseline demographic and clinical characteristics of the study participants are presented in Table 1. A total of 40 patients were included in the study. The majority of participants were aged above 51 years (35.0%), followed by those in the age groups of 31–40 years and 41–50 years (22.5% each), while 20.0% of patients were younger than 30 years. There was a female predominance in the study population, with 70.0% females and 30.0% males. Regarding clinical history, 27.5% of patients had a prior history of acute cholecystitis, whereas the majority (72.5%) did not report such a history. Only a small proportion of patients (7.5%) had a history of previous abdominal surgery, while 92.5% had no prior surgical history. Assessment of body mass index revealed that most patients were overweight (65.0%), followed by obese individuals (20.0%), and only 15.0% had a normal body mass index. Overall, the study population was predominantly composed of middle-aged to elderly, overweight females, with a relatively low prevalence of prior abdominal surgery and a moderate proportion having a history of acute cholecystitis.

Table 2: Preoperative Ultrasonographic and MRCP Findings (N = 40)

Variable	Category	Frequency (n)	Percentage (%)
Gall Bladder Wall Thickness	<3 mm	26	65.0
	≥3 mm	14	35.0
Pericholecystic Fluid Collection	Present	7	17.5
	Absent	33	82.5

Number of Gallstones	Single	15	37.5
	Multiple	25	62.5
Liver Parenchyma	Normal	34	85.0
	Fibrosed	6	15.0
MRCP Signal Intensity	High Signal Intensity (HSI)	16	40.0
	Intermediate Signal Intensity (ISI)	18	45.0
	Low Signal Intensity (LSI)	6	15.0

The preoperative ultrasonographic and MRCP findings of the study participants are summarized in Table 2. Gall bladder wall thickness was less than 3 mm in the majority of patients (65.0%), while 35.0% demonstrated a wall thickness of ≥3 mm. Pericholecystic fluid collection was observed in 17.5% of patients, whereas it was absent in 82.5%. With respect to gallstone characteristics, multiple gallstones were more commonly observed (62.5%) compared to single stones (37.5%). Evaluation of liver parenchyma revealed that most patients had normal liver echotexture (85.0%), while 15.0% showed features suggestive of liver fibrosis. On MRCP assessment, intermediate signal intensity was the most frequently observed pattern (45.0%), followed by high signal intensity in 40.0% of patients. Low signal intensity, which may indicate increased fibrosis or chronic inflammation, was noted in 15.0% of cases. Overall, the radiological profile suggests that a substantial proportion of patients had features associated with chronic inflammatory changes of the gall bladder.

Table 3: Intraoperative Parameters and Surgical Outcomes (N = 40)

Variable	Category	Frequency (n)	Percentage (%)
Access to Peritoneal Cavity	Easy	30	75.0
	Difficult	10	25.0
Gall Bladder Bed Dissection	Easy	32	80.0
	Difficult	8	20.0
Extraction of Gall Bladder	Easy	29	72.5
	Difficult	11	27.5
Intraoperative Bleeding	Normal	30	75.0
	Abnormal	10	25.0
Conversion to Open Surgery	No	36	90.0
	Yes	4	10.0

The intraoperative parameters and surgical outcomes of the study participants are presented in Table 3. Access to the peritoneal cavity was achieved easily in the majority of cases (75.0%), while 25.0% of patients experienced difficulty during access. Similarly, gall bladder bed dissection was easy in 80.0% of cases and difficult in 20.0%, indicating that a subset of patients required more complex surgical manipulation. Regarding extraction of the gall bladder, 72.5% of procedures were completed easily, whereas 27.5% were associated with difficulty. Intraoperative bleeding was normal in 75.0% of patients, while 25.0% experienced abnormal bleeding during the procedure. Conversion to open cholecystectomy was required in 10.0% of cases, while the remaining 90.0% were successfully completed laparoscopically. Overall, although the majority of procedures were performed without significant difficulty, a considerable proportion of patients demonstrated intraoperative challenges, highlighting the importance of preoperative predictors in anticipating surgical complexity.

Table 4: Association Between Clinical Parameters and Intraoperative Difficulty (N = 40)

Clinical Variable	Difficult n (%)	Easy n (%)	p-value
Access to Peritoneal Cavity			
BMI – Normal weight	1 (16.7)	5 (83.3)	<0.001*
BMI – Overweight	1 (3.8)	25 (96.2)	
BMI – Obese	8 (100.0)	0 (0.0)	
Previous Abdominal Surgery – Yes	2 (66.7)	1 (33.3)	0.148
Previous Abdominal Surgery – No	8 (21.6)	29 (78.4)	
Gall Bladder Bed Dissection			
H/O Acute Cholecystitis – Yes	6 (54.5)	5 (45.5)	0.001*
H/O Acute Cholecystitis – No	2 (6.9)	27 (93.1)	
Abnormal Intraoperative Bleeding			
H/O Acute Cholecystitis – Yes	6 (54.5)	5 (45.5)	0.008*
H/O Acute Cholecystitis – No	4 (13.8)	25 (86.2)	
Extraction of Gall Bladder			
BMI – Normal weight	1 (16.7)	5 (83.3)	<0.001*
BMI – Overweight	3 (11.5)	23 (88.5)	
BMI – Obese	7 (87.5)	1 (12.5)	

-statistically significant

The association between clinical parameters and intraoperative difficulty is presented in Table 4. Difficulty in access to the peritoneal cavity was significantly associated with higher body mass index.

All obese patients (100.0%) experienced difficult access, compared to only 16.7% of patients with normal BMI and 3.8% of overweight individuals, demonstrating a statistically significant association ($p < 0.001$). In contrast, a history of previous abdominal surgery did not show a significant association with difficulty in access ($p = 0.148$), although a higher proportion of such patients (66.7%) had difficult access compared to those without prior surgery (21.6%). Difficulty in gall bladder bed dissection was significantly associated with a history of acute cholecystitis. More than half of the patients with a positive history (54.5%) experienced difficult dissection, whereas only 6.9% of those without such a history had difficulty ($p = 0.001$). Similarly, abnormal intraoperative bleeding was also significantly associated with a history of acute cholecystitis, with 54.5% of affected patients experiencing bleeding complications compared to 13.8% among those without such a history ($p = 0.008$). Extraction of the gall bladder was significantly influenced by body mass index. A high proportion of obese patients (87.5%) had difficulty during extraction, compared to 16.7% of patients with normal BMI and 11.5% of overweight individuals, showing a strong statistically significant association ($p < 0.001$). Overall, obesity and history of acute cholecystitis emerged as important clinical predictors of intraoperative difficulty in laparoscopic cholecystectomy.

Table 5: Association Between Radiological Parameters and Intraoperative Difficulty (N = 40)

Radiological Variable	Difficult n (%)	Easy n (%)	p-value
Access to Peritoneal Cavity			
Pericholecystic Fluid – Present	5 (71.4)	2 (28.6)	0.002*
Pericholecystic Fluid – Absent	5 (15.2)	28 (84.8)	
Gall Bladder Bed Dissection			
GB Wall Thickness ≥3 mm	6 (35.7)	8 (64.3)	0.013*
GB Wall Thickness <3 mm	2 (7.7)	24 (92.3)	
MRCP Low Signal Intensity – Yes	4 (66.7)	2 (33.3)	0.009*
MRCP Low Signal Intensity – No	4 (11.8)	30 (88.2)	
Pericholecystic Fluid – Present	6 (85.7)	1 (14.3)	<0.001*
Pericholecystic Fluid – Absent	2 (6.1)	31 (93.9)	
Number of Gallstones – Multiple	4 (16.0)	21 (84.0)	0.414
Number of Gallstones – Single	4 (26.7)	11 (73.3)	
Abnormal Intraoperative Bleeding			
GB Wall Thickness ≥3 mm	7 (50.0)	7 (50.0)	0.007*
GB Wall Thickness <3 mm	3 (11.5)	23 (88.5)	
Liver Fibrosis – Present	6 (100.0)	0 (0.0)	<0.001*
Liver Fibrosis – Absent	4 (11.8)	30 (88.2)	

-statistically significant

The association between radiological parameters and intraoperative difficulty is summarized in Table 5. Difficulty in access to the peritoneal cavity was significantly associated with the presence of pericholecystic fluid. A substantially higher proportion of patients with pericholecystic fluid (71.4%) experienced difficult access compared to those without fluid collection (15.2%), and this association was statistically significant ($p = 0.002$). Difficulty in gall bladder bed dissection showed significant associations with multiple radiological factors. Patients with gall bladder wall thickness ≥3 mm had a higher incidence of difficult dissection (35.7%) compared to those with wall thickness <3 mm (7.7%) ($p = 0.013$). Similarly, MRCP low signal intensity was significantly associated with difficult dissection, with 66.7% of such patients experiencing difficulty compared to 11.8% among those without low signal intensity ($p = 0.009$). The presence of pericholecystic fluid demonstrated a strong association with difficult dissection, as 85.7% of patients with fluid collection had difficulty compared to only 6.1% without fluid ($p < 0.001$). In contrast, the number of gallstones did not show a statistically significant association with dissection difficulty ($p = 0.414$). Abnormal intraoperative bleeding was also significantly associated with certain radiological parameters. Patients with gall bladder wall thickness ≥3 mm had a higher incidence of bleeding (50.0%) compared to those with thinner walls (11.5%) ($p = 0.007$). Furthermore, liver fibrosis showed a strong association with intraoperative bleeding, as all patients with fibrosed liver parenchyma (100.0%) experienced abnormal bleeding, compared to only 11.8% among those with normal liver parenchyma ($p < 0.001$). Overall, radiological parameters such as pericholecystic fluid, increased gall bladder wall thickness, MRCP signal changes, and liver fibrosis were significant predictors of intraoperative difficulty.

DISCUSSION

In the present study, obesity was significantly associated with difficult access to the peritoneal cavity and difficult extraction of the gall bladder. All obese patients had difficult peritoneal access, and 87.5% had difficulty during gall bladder extraction. This finding is comparable with the observations of Hassan et al., who reported BMI >30 kg/m² as a significant predictor of difficult laparoscopic cholecystectomy.[2] Similar findings were reported by Hamza et al., who identified morbid obesity as an important factor increasing technical difficulty.[3]

Hasan et al. also observed that BMI >30 kg/m² was associated with difficult laparoscopic cholecystectomy.[4] In addition, Ghanem et al. reported obesity as one of the significant predictors of difficult laparoscopic cholecystectomy.[7] Thus, the present study supports the existing evidence that obesity increases operative difficulty, probably due to difficulty in port placement, thick abdominal wall, excessive intra-abdominal fat, and reduced operative field exposure.

A history of acute cholecystitis was significantly associated with difficult gall bladder bed dissection and abnormal intraoperative bleeding in the present study. Among patients with previous acute cholecystitis, 54.5% had difficult dissection and 54.5% had abnormal bleeding. This finding is consistent with Agarwal et al., who reported that repeated attacks of cholecystitis increased the chance of difficult laparoscopic cholecystectomy.[1] Hassan et al. similarly found recurrent acute attacks to be significantly associated with difficulty and possible conversion.[2] Hamza et al. also observed that a previous history of acute cholecystitis increased the technical difficulty of laparoscopic cholecystectomy.[3] Toppo et al. further reported acute cholecystitis and multiple previous attacks as significant predictors of conversion to open cholecystectomy.[9] These findings indicate that previous inflammation may lead to adhesions, fibrosis, tissue edema, and altered surgical planes, thereby increasing the complexity of dissection and the risk of bleeding.

In the present study, previous abdominal surgery was not significantly associated with difficulty in access to the peritoneal cavity, although a higher proportion of patients with previous surgery had difficult access. This finding differs from Hamza et al., who reported previous abdominal surgery as a factor increasing technical difficulty.[3] Challapalli et al. also identified previous upper abdominal surgery as a predictor of difficult laparoscopic cholecystectomy.[6] Ghanem et al. found previous abdominal surgery to have a significant association with operative outcome,[7] and Tanwar et al. reported previous abdominal surgery as one of the preoperative factors predicting difficulty.[8] The lack of statistical significance in the present study may be due to the small number of patients with prior abdominal surgery, as only 7.5% had such a history.

Gall bladder wall thickness ≥3 mm was significantly associated with difficult gall bladder bed dissection and abnormal intraoperative bleeding in this study. Difficult dissection was observed in 35.7% of patients with thickened gall bladder wall, while abnormal bleeding occurred in 50.0% of such patients. This finding is similar to Hassan et al., who reported thick-walled gall bladder as a significant predictor of difficult laparoscopic cholecystectomy.[2] Hamza et al. also identified increased gall bladder wall thickness as an ultrasonographic predictor of technical difficulty.[3] Hasan et al. found gall bladder wall thickness >3 mm to be associated with difficult laparoscopic cholecystectomy.[4] Tanwar et al. similarly reported gall bladder wall thickness >3 mm as a predictor of operative difficulty.[8] These observations support the role of gall bladder wall thickening as a marker of chronic inflammation and fibrosis, which may make grasping, retraction, dissection, and hemostasis more difficult.

Pericholecystic fluid collection showed a strong association with intraoperative difficulty in the present study. It was significantly associated with difficult access to the peritoneal cavity and difficult gall bladder bed dissection. Among patients with pericholecystic fluid, 71.4% had difficult access and 85.7% had difficult dissection. This is comparable with Hamza et al., who reported pericholecystic fluid collection as an important ultrasonographic predictor of difficult laparoscopic cholecystectomy.[3] Sanniyasi et al. also found pericholecystic fluid on ultrasound to be a strong predictor of difficult cholecystectomy.[5] Challapalli et al. reported pericholecystic collection as one of the predictors of difficult laparoscopic cholecystectomy.[6] Bansal et al. similarly observed that pericholecystic fluid collection was significantly associated with operative difficulty.[10] These findings suggest that pericholecystic fluid reflects active or recent inflammation, which may be associated with edema, adhesions, and distorted tissue planes.

MRCP low signal intensity was significantly associated with difficult gall bladder bed dissection in the present study. Among patients with low signal intensity on MRCP, 66.7% had difficult dissection compared to 11.8% without low signal intensity. Although most previous studies have focused predominantly on ultrasonographic parameters, Agarwal et al. emphasized that preoperative radiological investigations, including USG and MRCP, are useful predictors of difficult laparoscopic cholecystectomy.[1] Hassan et al. also highlighted the importance of preoperative imaging parameters in anticipating difficulty.[2] Hamza et al. demonstrated that radiological characteristics of the gall bladder were useful in predicting technical difficulty.[3] Hasan et al. further supported the role of combined clinicoradiological assessment in predicting operative challenges.[4] The present study adds value by specifically demonstrating that MRCP signal intensity may provide additional information regarding chronic inflammatory or fibrotic changes affecting dissection difficulty.

In the present study, the number of gallstones was not significantly associated with difficulty in gall bladder bed dissection. This differs from Hassan et al., who found multiple gall bladder calculi to be significantly associated with difficult laparoscopic cholecystectomy.[2] Agarwal et al. also observed that multiple stones, particularly small stones, were associated with increased operative difficulty.[1] Ghanem et al. reported large multiple gall bladder stones as significantly associated with operative outcome.[7] Bansal et al. found stone size >1 cm to be

a significant predictor of difficult laparoscopic cholecystectomy.[10] The difference in the present study may be due to the small sample size and the fact that stone size, impaction at the neck, and contracted gall bladder were not analyzed in detail.

Liver fibrosis was strongly associated with abnormal intraoperative bleeding in the present study. All patients with fibrosed liver parenchyma experienced abnormal bleeding, compared with only 11.8% of those with normal liver parenchyma. This finding is in agreement with Ghanem et al., who reported that liver ultrasonographic findings had a significant association with final operative outcome.[7] Hassan et al. also considered abnormal liver function and related hepatobiliary factors among parameters influencing difficulty.[2] Bansal et al. identified deranged liver function tests as significant predictors of difficult laparoscopic cholecystectomy.[10] Hamza et al. emphasized that clinical and radiological characteristics can help anticipate intraoperative complications.[3] The present finding suggests that altered liver parenchyma may increase bleeding tendency during gall bladder bed dissection and should be considered during preoperative planning.

The conversion rate to open cholecystectomy in the present study was 10.0%. This was higher than the 4.0% conversion rate reported by Hassan et al,[2] and Tanwar et al,[8] but comparable to Toppo et al., who reported a conversion rate of 10.75%.[9] Hasan et al. reported conversion in 8.6% of patients, which is also close to the present study.[4] Differences in conversion rates across studies may be explained by variation in sample size, case selection, severity of inflammatory disease, surgeon experience, and criteria used to define difficult laparoscopic cholecystectomy. Overall, the present study reinforces that preoperative clinical and radiological assessment can help identify high-risk cases and prepare the surgical team for possible intraoperative difficulty or conversion.

Limitations

The study was limited by a small sample size (N = 40), which may affect the generalizability and statistical power of the findings. Additionally, the absence of multivariate analysis limits the ability to identify independent predictors of difficult laparoscopic cholecystectomy.

CONCLUSION

The present study demonstrates that preoperative clinical and radiological parameters play a crucial role in predicting intraoperative difficulty during laparoscopic cholecystectomy. Among clinical factors, obesity and a history of acute cholecystitis were significantly associated with increased operative difficulty, including challenging access, difficult dissection, and increased intraoperative bleeding. Radiological parameters such as gall bladder wall thickness ≥3 mm, presence of pericholecystic fluid, MRCP low signal intensity, and liver fibrosis were also found to be significant predictors of operative complexity. These findings highlight that a combination of clinical history and imaging features can effectively identify patients at higher risk for difficult laparoscopic cholecystectomy.

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