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Original Research Article

Prediction of the grade of acute cholecystitis by plasma level of C-reactive protein and ESR

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ABSTRACT

Background: Acute cholecystitis is a common complication of gallbladder stones and common surgical disease. Tokyo guidelines have been introduced to standardize the diagnosis and evaluation of the disease. The guidelines include physical examination, laboratory results like C-reactive protein (CRP), white blood cell levels, and radiologic evaluation. The clinical severity of the disease is assigned to one of three grades based on these criteria. CRP levels are used as a diagnostic criterion. The 2018 Tokyo Guidelines include increased CRP levels as a criterion for diagnosis.
Methods: Observational analytical prospective cohort study, conducted in General Surgery Peoples hospital, Bhopal from Nov 2022 to Feb 2024, patients visiting OPD with investigations suggesting any Gallbladder infection and inflammation S/o acute cholecystitis.
Results: The study found a significant association between raised CRP levels and severe cholecystitis, with CRP levels exceeding 6 mg/L in 100% severe cases and 40% moderate cases. Additionally, ESR was significantly associated with cholecystitis grade, with all cases having raised ESR above 39 mm/hr.
Conclusions: The study found that 60% of patients with acute cholecystitis had mild symptoms, with the majority being young (57.8%). The majority of cases were male, with 62.2% of mild cases being female. The study found no significant association between the grade of cholecystitis and past history of upper abdominal surgery, pancreatitis, or acute cholecystitis. However, the presence of cirrhotic liver disease was significantly associated with moderate to severe cholecystitis. Severe cholecystitis was associated with gall bladder wall thickness, CBD diameter, multiple stones, and bile spillage.

Keywords: Acute cholecystitis, C-reactive protein, Erythrocyte sedimentation rate, Tokyo guidelines

INTRODUCTION

Acute cholecystitis is an inflammation of the gall bladder, characterized by symptoms like abdominal pain, nausea, and vomiting. It is a common surgical condition and contributes to abdominal morbidity and mortality globally. Prevalence in India ranges from 2% to 29%, with 10% of the population having gall stones and 20% presenting with symptoms. Untreated cases can lead to complications like gall bladder perforation, sepsis, gangrene, empyema, or even death.[1] Early diagnosis and management are crucial to reduce morbidity and mortality. The Tokyo guidelines have standardized the diagnosis and evaluation of cases, based on physical examination, laboratory parameters, and radiologic evaluation. Acute cholecystitis is linked to inflammation, with markers like C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) being key indicators. CRP is a non-specific marker of inflammation, rising 6-8 hours after inflammation onset.[2] It is a diagnostic criterion for acute cholecystitis, but not for disease severity assessment. Previous studies have shown

CRP's correlation with inflammation severity, but ESR's utility and cut-off level are not yet understood. This study aims to investigate plasma CRP and ESR levels in patients with acute cholecystitis and assess its severity.[3]

Need of study

Acute cholecystitis is a common gastrointestinal disease requiring hospitalization and surgical treatment. CRP levels correlate with severity and inflammation, predicting laparoscopic cholecystectomy difficulty. Surgeons can use CRP and ESR results to choose management modality and educate patients about surgery difficulty and conversion possibilities. Further research is needed to investigate C-reactive protein levels and severity in acute cholecystitis.

Aim

The aim of this study was prediction of the grade of acute cholecystitis by plasma level of C-reactive protein and ESR.

METHODS

Inclusion criteria

All the patients above 18 years. CRP checked at least once at the time of admission. ESR checked at least once at the time of admission.

Exclusion criteria

Patients under the age of eighteen were excluded. Patients whose ESR and CRP were not measured at arrival. Individuals with co-occurring illnesses (diabetes mellitus, HIV, hepatitis, intestinal TB, and immunocompromised conditions). Patients whose histology revealed cancer. Individuals with elevated CRP who may have a related illness, such as acute pancreatitis. Patients who were expecting.

Methodology

It was a diagnostic, observational cohort study. The data analysis was done using SPSS software.

Ethical considerations

Human participants

Since the study involves patients, ethical concerns about informed consent and confidentiality of their medical data must be addressed.

Risk to participants

This is a relatively non-invasive study, as CRP and ESR are both blood markers that are already commonly measured in clinical settings. There's no new treatment being tested or high-risk intervention involved. Therefore, the risk to participants should be minimal. However, participants must still be fully informed about the nature of the study and how their data will be used.

Privacy and data protection

Patient data, such as CRP and ESR levels and clinical information regarding the grade of cholecystitis, must be handled with strict confidentiality. This likely involved de-identifying patient data before it was analyzed to ensure privacy.

Informed consent

Informed consent is an essential part of ethical approval for any study involving human participants. Patients were clearly informed about the purpose of the study, the data that was collected, and any risks involved. The consent should be documented properly.

Ethical justification

The study must also demonstrate the potential clinical benefit or scientific value of the findings. In this case, predicting the grade of acute cholecystitis using non-invasive biomarkers like CRP and ESR could improve diagnosis and treatment, making the study valuable for advancing medical knowledge.

Potential conflicts of interest

The research team should disclose any conflicts of interest, ensuring that the study's design, conduct, and interpretation are not unduly influenced by outside parties.

Surgery technique

Laparoscopic cholecystectomy

Under general anesthesia, the procedure was carried out with controlled ventilation, end-tidal carbon dioxide monitoring, and pulse oximetry. A pneumoperitoneum was formed by placing the patient in a supine position with a 150 head tilt and upright posture.[4] Two 5 mm and two 10 mm ports were implanted, with the right subcostal area receiving a 5 mm port and the umbilical and epigastric regions receiving a 10 mm port. The Rouviere's sulcus was visualized, and Calot's triangle was recognized and skeletonized. Bile duct damage can be avoided by adhering to Strasberg's critical view of safety.[5] For hemostasis, the gallbladder was removed from the liver bed and clips were placed across the cystic artery and duct. To relieve postoperative pain, analgesic infiltration was administered at the surgical site.

In an open cholecystectomy, the gallbladder was removed by making a right subcostal incision, which allows for

sufficient exposure and visualization of the bile ducts, triangle of Calot, and gallbladder. The gallbladder was subsequently extracted from the liver by the surgeon using a harmonic scalpel or electrocautery.[6] Based on variables such as high bilirubin and dilated common bile duct, cholangiogram or common bile duct exploration was carried out, and the gallbladder bed was checked for bleeding or bile leakage. The abdomen has many layers of closure. A decompression needle could be required if inflammation has made the gallbladder tight.[7]

RESULTS

Mean age of patients who underwent laparoscopic cholecystectomy in our study was 44±12.78 years and majority i.e. 29.3% cases belonged to age range of 41 to 50 years, followed by 26.7% cases belonging to 31 to 40 years of age. Only 9.3% cases belonged to elderly age group.

Table 1: Distribution of cases according to age.

Age (years)	Frequency (n=75)	Percentage
≤30	12	16.0
31-40	20	26.7
41-50	23	30.7
51-60	13	17.3
>60	7	9.3
Mean±SD	43.95±12.75	

Table 2: Distribution of cases according to findings of ultrasonography.

USG parameters		Frequency (n=75)	Percentage
Gall bladder wall thickness	<4 mm	68	90.7
	>4 mm	7	9.3
CBD diameter	<6 mm	64	85.3
	>6 mm	11	14.7
Number of stone	Single	62	82.7
	Multiple	13	17.3
Size of stone	<1 cm	11	14.7
	>1 cm	64	85.3
Impacted stone at neck of GB	Absent	67	89.3
	Present	8	10.7
Bile spillage	Absent	60	80.0
	Present	15	20.0

USG revealed gall bladder wall thickness of more than 4 mm in 9.3% cases, CBD diameter was more than 6 mm in 14.7% cases. Majority of cases had single stone (82.7%) whereas 17.3% cases had multiple stone. Size of stone was more than 1 cm in 85.3% cases and impacted stone at the neck of gall bladder was found in 10.7% cases. Bile spillage was noted in 20% cases on USG.

Mean CRP levels in patients with acute cholecystitis enrolled in our study were 4.123±4.99 mg/l. CRP was above 6 mg/l in 24% cases whereas it was slightly raised in 16% cases.

Table 3: CRP levels in patients with acute cholecystitis.

CRP (mg/l)	Frequency (n=75)	Percentage
<1	45	60.0
1-6	12	16.0
>6	18	24.0
Mean±SD	4.123±4.99	

Mean ESR levels among our study population were 26.24±12.45 mm/hour. ESR ranged from 14 to 18 mm/hour in 52% cases whereas it ranged between 19 to 38 and 39 to 50 in 32% and 16% cases respectively.

Table 4: Serum ESR in patients with acute cholecystitis.

Serum ESR (mm/hour)	Frequency (n=75)	Percentage
14-18	39	52.0
19-38	24	32.0
39-50	12	16.0
Mean±SD	26.24±12.45	

Table 5: Distribution of patients according to grade of cholecystitis.

Grade of cholecystitis	Frequency (n=75)	Percentage
Mild	45	60.0
Moderate	20	26.7
Severe	10	13.3

In present study, 60% cases presented with mild cholecystitis whereas moderate and severe cholecystitis was noted in 26.75 and 13.3% cases respectively.

Table 6: Association of grade of acute cholecystitis with age.

Age (years)	Grade of cholecystitis					
	Mild (n=45)		Moderate (n=20)		Severe (n=10)	
	N	%	N	%	N	%
<30	9	20.0	1	5.0	2	20.0
31-40	17	37.8	2	10.0	1	10.0
41-50	13	28.9	8	40.0	2	20.0
51-60	4	8.9	5	25.0	4	40.0
>60	2	4.4	4	20.0	1	10.0
χ^2	17.35					
P value	0.027					

Out of 45 cases with mild cholecystitis, majority of cases (57.8%) belonged to young age group (<40 years) whereas 40% cases with moderate cholecystitis and

severe cholecystitis belonged to 41 to 50 years and 51 to 60 years of age. The observed association of grade of cholecystitis with age was found to be statistically significant (p<0.05).

Table 7: Association of grade of acute cholecystitis with USG findings.

USG		Grade of cholecystitis						χ^2	P value
		Mild (n=45)		Moderate (n=20)		Severe (n=10)			
		N	%	N	%	N	%		
Gall bladder wall thickness	<4 mm	45	100.0	16	80.0	7	70.0	12.37	0.02
	>4 mm	0	0.0	4	20.0	3	30.0		
CBD diameter	<6 mm	43	95.6	15	75.0	6	60.0	10.59	0.005
	>6 mm	2	4.4	5	25.0	4	40.0		
Number of stone	Single	40	88.9	17	85.0	5	50.0	8.73	0.014
	Multiple	5	11.1	3	15.0	5	50.0		
Size of stone	<1 cm	5	11.1	2	10.0	4	40.0	5.93	0.052
	>1 cm	40	88.9	18	90.0	6	60.0		
Impacted stone at neck of GB	Absent	45	100.0	17	85.0	5	50.0	22.002	0.001
	Present	0	0.0	3	15.0	5	50.0		
Bile spillage	Absent	45	100.0	14	70.0	1	10.0	43.13	0.001
	Present	0	0.0	6	30.0	9	90.0		

Table 8: Association of grade of acute cholecystitis with CRP.

CRP (mg/l)	Grade of cholecystitis					
	Mild (n=45)		Moderate (n=20)		Severe (n=10)	
	N	%	N	%	N	%
<1	45	100.0	0	0.0	0	0.0
1-6	0	0.0	12	60.0	0	0.0
>6	0	0.0	8	40.0	10	100.0
Mean±SD	0.782±0.248		6.400±1.35		14.60±3.37	
χ^2	100.00					
P value	0.001					

Table 9: Association of grade of acute cholecystitis with ESR.

Serum ESR (mm/hour)	Grade of cholecystitis					
	Mild (n=45)		Moderate (n=20)		Severe (n=10)	
	N	%	N	%	N	%
14-18	39	86.7	0	0.0	0	0.0
19-38	6	13.3	18	90.0	0	0.0
39-50	0	0.0	2	10.0	10	100.0
Mean±SD	16.89±1.65		35.60±3.28		49.60±0.843	
χ^2	106.88					
P value	0.001					

As observed from the Table 7, gall bladder wall thickness of more than 4 mm, CBD diameter of more than 6 mm, multiple stones, impacted stone at the neck of gall bladder and presence of bile spillage were significantly associated with severe cholecystitis (p<0.05).

In all the cases with mild cholecystitis, CRP was less than 1 mg/l, whereas in 60% cases with moderate cholecystitis CRP ranged between 1 to 6 mg/l. CRP levels were more than 6 mg/l in 100% cases with severe and 40% cases with moderate cholecystitis. The observed association of raised CRP with severe grade of cholecystitis was statistically significant (p<0.05).

As observed from the above table, mean ESR levels in patients with mild, moderate and severe cholecystitis were 16.89±1.65, 35.60±3.28 and 49.60±0.843 mm/hour respectively. Majority of cases with mild cholecystitis had ESR in the range of 14 to 18 mm/hour (86.7%) whereas 90% cases with moderate cholecystitis had ESR

in the range of 19 to 38 mm/hour. All the cases with ESR had raised ESR above 39 mm/hour. We found a significant association of grade of cholecystitis with raised ESR ($p<0.05$).

DISCUSSION

Acute cholecystitis, a condition characterized by inflammation of gall bladder is associated with marked inflammatory changes and markers of inflammation may be used to predict the severity of cholecystitis. According to Tokyo guidelines criteria, diagnosis of acute cholecystitis should be based on findings of physical examination, laboratory parameters (e.g. WBC, CRP etc.) and radiologic evaluation. These guidelines also suggest the parameters to assess the severity of disease.[7] However, CRP has been used as a marker in diagnosis but not in assessment of severity of acute cholecystitis in Tokyo guidelines.[8] Apart from CRP, ESR, another acute phase reactant is a non-specific marker of inflammation, and its level start rising 6 to 8 hours after the onset of inflammation. Tokyo guidelines recommend use of CRP but not ESR. The present study entitled "prediction of the grade of acute cholecystitis by plasma level of C-reactive protein and ESR" was conducted on a total of 75 cases presenting with acute cholecystitis at our study area during the study period to investigate plasma level of C-reactive protein and ESR and predict the severity of acute cholecystitis using ESR and CRP.

Grade of acute cholecystitis based on Tokyo guidelines

Based on physical examination, laboratory, and imaging results, the Tokyo guidelines criteria for the diagnosis and categorization of AC in three severity classes (mild, moderate, and severe).[5] In present study, out of 75 cases with acute cholecystitis, majority of cases had mild cholecystitis (60%), whereas approximately one fourth (26.7%) cases had moderate cholecystitis. Severe cholecystitis was noted in 13.3% cases.

Similarly in a study of Gurbulak et al, a total of 682 patients were included, of them, 439 (64.4%) had mild cholecystitis, 220 (32.3%) had moderate cholecystitis and remaining 23 (3.4%) had severe cholecystitis. In a study of Yuzbasioglu et al, majority i.e. 55% cases had mild, 30.5% cases had moderate and 14.5% cases had severe cholecystitis. In another study by Yuzbasioglu et al, the authors documented mild, moderate and severe acute cholecystitis inn 57.6%, 28.8% and 13.6% cases respectively.[9]

However, in a study of Sakalar et al, grade I acute cholecystitis was noted in 42.1% cases, 20% cases had grade 2 cholecystitis whereas 37.9% cases had grade 3 acute cholecystitis.[10] Unal et al in their study in 528 patients found mild cholecystitis in 73.1% cases, moderate in 19.3% cases and severe cholecystitis in 7.6% cases.[11] In a study of Park et al, 217 patients were included, of them, 67.3% cases had grade I AC (mild), 23.5% had grade 2 and 9.2% cases had grade 3 AC.[12]

The first line of treatment for grade 1 acute cholecystitis, according to Tokyo recommendations, is early laparoscopic cholecystectomy; for grade 2 patients, it is elective cholecystectomy. A patient with grade 2 acute cholecystitis has to have their gallbladder drained quickly if they do not improve after receiving first medical care. Along with organ support and medical care, individuals with grade 3 acute cholecystitis require urgent gallbladder drainage.[13]

Sociodemographic variables

A total of 75 individuals with acute cholecystitis, whose mean age was 43.95±12.75 years, were included. Research indicates that women are approximately 1.5 times more likely than men to have acute calculous cholecystitis beyond the age of 50, and up to that point, they are three times more probable.[14] The majority of the instances in our research (30.7%) were from those aged 41 to 50, with cases from people aged 31 to 40 coming in second (26.7%). As a result, the bulk of the participants in our research were middle-aged, with only 9.3% being old. With a female:male ratio of 1.14:1, we observed a little female preponderance for acute cholecystitis in our research. Females accounted for almost half (53.3%) of the cases. Although we did not find a significant correlation between gender and cholecystitis grade, we did find that patients between the ages of 51 and 60 had more severe cholecystitis than patients under the age of 50 ($p<0.05$). The results of our study were corroborated by those of Gurbulak et al, who found that the majority of patients with acute cholecystitis- 60.8% of the total- were female and that the mean age of the patients was 51.61±16.65 years. Patients with mild, moderate, and severe cholecystitis had mean ages of 48.97, 55.06, and 68.78 years, respectively, indicating that the severity of cholecystitis increased with age. In all severity categories, however, the majority of patients were female ($p<0.05$).[14]

In a research conducted by Muhammad et al, the average age of the patients was 40.32±5.3 years. About half of the patients were over 40, and the authors found that women were more likely than men to have acute cholecystitis, accounting for 75% of cases.[15] Although the mean age of patients in a study by Sakalar et al was higher than in our study (59.87±1.96 years) and there was a reported male predominance (50.5%), the authors discovered a significant correlation between the severity of acute cholecystitis and advancing age ($p<0.05$), but not with gender ($p>0.05$), which corroborated the results of our study.[16]

The results of Park et al corroborated our findings as well. They discovered that patients with grade III AC (69.9±9.9 years) were substantially older than those with grade II (64.3±15.4 years) and grade I (56.9±13.9 years) ($p<0.05$).[17]

USG parameters

Tokyo guidelines take certain USG parameters into consideration such as probe tenderness in the area of gall bladder, GB wall thickness >4 mm, enlarged gall bladder, impacted gall stones, presence of debris or pericholecystic fluid collection and sonolucent layer in GB wall.[18] In our study, USG was done in all the cases to assess the characteristics of gall bladder and presence of stone. We documented gall bladder wall to be thickened in 9.3% cases (>4 mm and CBD diameter was more than 6 in 14.7% cases. About 17.3% cases had multiple stones, stone impacted at the neck of gall bladder was seen in 10.7% cases and size of stones in maximum cases was more than 1 cm (85.3%). We reported bile spillage in 20% cases. In our study, thickened gall bladder wall, increased CBD diameter (>6 mm), presence of multiple and impacted gall stones at neck of gall bladder and bile spillage were significantly associated with higher severity of acute cholecystitis ($p<0.05$), however, no association was noted with size of stones ($p>0.05$).[19]

In a study of Lodha et al, gallbladder wall was thickened in 47.3% of patients. The percentage of patients with pericholecystic fluid was about 37.8%. Just 17.6% of patients had a single gallstone in their gallbladder, compared to 81.1% who had several stones. The average size of the many stones was 6.85 mm, whereas the single stone's average size was 10.65 mm. Only four of the 74 patients exhibited CBD stones on ultrasonography, and only 20.3% of them had dilated CBD (≥8 mm). The CBD stones had an average size of 7.84 mm. In addition to presenting more frequently with biliary colic, acute calculus cholecystitis, and choledocholithiasis, over 80% of patients had multiple gallstones.[20]

Yuzbasioglu et al found a positive correlation of presence of USG findings with moderate severity of cholecystitis ($p<0.05$).[21]

In a study of Thapa et al, on USG, the GB wall thickened (>4 mm) was documented in 40 (80%) individuals and of them, 6 (12%) were in grade II, sixteen (32%), and eighteen (36%) were in grade I. Five (10%), four (8%) and fourteen (28%), respectively, of the twenty-three (46%) patients with sonographic findings of pericholecystic collection had grade I, grade II, and grade III. Nine patients (18%), four patients (10%), and fifteen patients (30%) out of the twenty-eight (56%) patients with enlarged gall bladders had severity grades I, II, and III. The least prevalent sonographic finding to establish AC was an enlarged gall bladder.[22] Though the USG parameters abnormality increased with higher severity of AC, the authors did not show clinical significance.

C-reactive protein

Tokyo guidelines include CRP levels in diagnosis of acute cholecystitis but not in assessing severity.[23] Amongst our study population, mean CRP levels were 4.123±4.99 mg/l. CRP levels were more than 6 mg/l in 24% cases and all the cases with severe cholecystitis had CRP levels more than 6 mg/l. In all the cases with mild cholecystitis, CRP levels were less than 1 mg/l, however, in patients with moderate cholecystitis, CRP levels were more than 6 in 40% cases. CRP increased significantly with increased severity of illness ($p<0.05$). Mean CRP levels in mild, moderate and severe cholecystitis was 0.782±0.248, 6.400±1.35 and 14.60±3.37 mg/l respectively. As per the Tokyo guidelines, individuals classified as mild cholecystitis had uncomplicated acute cholecystitis. This group of patients has no sepsis or bacteremia. Thus, individuals with mild acute cholecystitis seldom have extremely high CRP values and some of them even have normal CRP levels. Gallbladder inflammation in grade 2 patients, in contrast to grade 1 cases, becomes more complex and may be accompanied by sepsis, bacteremia, or systemic inflammatory response syndrome (SIRS), but not organ failure. As a result, greater CRP levels are anticipated in this group. According to the Tokyo recommendation, patients with grade 3 cholecystitis had associated organ dysfunction; however, the original guideline did not stress whether this dysfunction was discovered during follow-up or was obvious at the time of admission.[24]

Mohammad et al reported significant elevation in CRP levels in patients with acute cholecystitis as compared to control group (75% versus 33.3%; $p<0.05$).[20-24]

Our study findings were supported by the findings of Gurbulak et al, where mean CRP levels in patients with acute cholecystitis was 18.96 mg/l in mild cases, 133.51 mg/l in cases with moderate cholecystitis and 237.23 mg/l in cases with severe cholecystitis. The authors found mean CRP levels to correlated with disease severity, i.e. CRP levels increased with increase in disease severity ($p<0.05$).[24]

The findings of present study were concordant with the findings of Park et al, where median CRP levels in patients with mild cholecystitis were 2.95, whereas that in moderate and severe cholecystitis were 12.50 and 230.10 respectively. Thus, the CRP levels increased significantly with increase in severity of AC.[25]

Yuzbasioglu et al reported elevated CRP levels in 44.5% cases of mild, 60.7% cases of moderate and 86.2% cases of severe acute cholecystitis and the observed increase in CTP with increasing severity was statistically significant ($p<0.05$). Sakalar et al also reported CRP to be a significant predictor of severity of acute cholecystitis ($p<0.05$), with higher CRP values in higher grades of infection.

Our study findings were also consistent with the findings of Vural et al (2022) the mean CRP levels were found to be highest in group not responding to medical treatment indicating higher grade of Ac as compared to group responding to treatment (19.3±13.9 versus 9.6±5.2;

p=0.0003). Unal et al also showed CRP to be a significant parameter for distinguishing patients of mild cholecystitis from that of acute cholecystitis (p<0.05).

Erythrocyte sedimentation rate

ESR is also an acute phase reactant, however, its role in diagnosis of acute cholecystitis as well as in assessing is severity is not fully elicited. Amongst patients with acute cholecystitis in our study, mean ESR levels were 26.24±12.45 mm/hour and ESR ranged from 14 to 18, 19 to 38 and 39 to 50 mm/hour in 52%, 32% and 16% cases respectively. We observed a significant correlation of higher severity with higher ESR levels (p<0.05).

Yuzbasioglu et al found ESR to be elevated in 69.1% cases with mild acute cholecystitis, 75.4% cases with moderate cholecystitis and 79.3% cases with severe cholecystitis. The median ESR levels were found to be significantly higher in severe cholecystitis (41.5), as compared to moderate (32) and mild cholecystitis (22) (p<0.05).

Prakash et al in their study found ESR level ≥11 mm/hour in 78.7% cases with acute cholecystitis and found a significant association of ESR levels with pericholecystic Adhesion and documented CRP to be better predictor than ESR.

However, ESR is a low-sensitivity and low-specificity measure that rises in a number of clinical situations, including pregnancy, neoplasia, autoimmune events, and infections. In line with previous research, we found that the severity of AC was associated with an increase in ESR level. We propose that the elevated burden of inflammation is the primary cause of this rise.

The present study had certain limitations. The study was conducted at a single centre and sample size was small, thus the findings could not be generalized. Second the long-term outcome of patients was not assessed, only the severity of acute cholecystitis with CRP and ESR was assessed.

CONCLUSION

Laparoscopic cholecystectomy is a common surgical procedure for symptomatic cholelithiasis. Prior to surgery, a thorough clinical assessment, including history, examination, and ultrasound (USG), is crucial. Preoperative ultrasound can identify cases likely to be challenging and anticipate potential complications. Significant predictors of difficult laparoscopic cholecystectomies include a history of recurrent acute cholecystitis, pancreatitis, chronic liver disease, and previous gallbladder-related hospitalizations. Specific USG findings, such as gallbladder wall thickness, common bile duct (CBD) diameter, number and size of gallstones, presence of impacted stones, and signs of chronic liver disease, further inform risk assessment.

Intraoperative challenges may arise from bile spillage, common bile duct injury, diffuse bleeding, and complications during dissection at Calot's triangle and the gallbladder bed.

Although not all difficult procedures necessitate conversion to open surgery, those deemed very difficult typically do. Such difficulties can significantly extend both the duration of the operation and the patient's length of hospital stay.

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