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Assessment of the risk for cholecystitis when performing laparoscopic cholecystectomy in a retrospective cohort study

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Abstract

Background/Aim: Acute cholecystitis most often occurs as an acute exacerbation of chronic cholecystitis. In over 90% of patients, the primary factor in the development of acute cholecystitis is the obstruction of the gallbladder or cystic duct with an impacted calculus. In less than 10% of patients, acute cholecystitis can be attributed to other causes: direct trauma to the biliary tract, torsion of the gallbladder, twisting of the vascular loop after surgical procedures on the abdominal organs, and *Salmonella typhi* infection. The aim of this study is to compare preoperative variables in patients with acute cholecystitis, which are not only important for diagnosis but also have significance in determining the severity of acute cholecystitis in the preoperative period.

Methods: This retrospective systematic research included all clinical cases diagnosed with acute cholecystitis from January 2019 to December 2019, totaling 56 patients at CHC Kosovska Mitrovica. For the study, data from medical records were used for statistical analysis.

Results: A total of 56 patients (mean age 53 years; 26 men and 30 women) were included in this study. Among them, 32 patients (57.15%) had characteristics of simple cholecystitis, while 24 patients (42.85%) had severe cholecystitis. The group with severe cholecystitis consisted of older patients, with equal representation of both sexes, and higher levels of WBC, NE%, PLT, ALT, GGT, total bilirubin, and CRP ($P<0.05$). Imaging studies showed that the group with severe cholecystitis exhibited significantly more wall distension, particularly in the stratified wall, compared to the group with simple cholecystitis ($P<0.05$). Severe cholecystitis was associated with statin use (79.2%) and triglyceride values of 1.55 (0.47); both variables showed a statistically significant association with severe cholecystitis ($P<0.05$).

Conclusion: It is extremely important to skillfully identify patients with simple or severe forms of acute cholecystitis. Possible solutions include organizing campaigns to raise public awareness for faster consultations in cases of acute abdominal pain, establishing universal health coverage (diet), and improving technical platforms.

Keywords: cholecystitis, acute, statins

Introduction

Acute cholecystitis is an inflammatory process characterized by gallbladder distension, wall thickening, exudate formation, and the presence of pericholecystic fluid [1]. This disease is one of the most common gastrointestinal diseases that requires hospitalization and surgical treatment [2]. The most common cause of cholelithiasis is the deposition of cholesterol, which later forms cholesterol stones [3]. Symptomatic cholelithiasis is manifested by biliary colic, which refers to acute severe pain attacks localized in the right upper quadrant or epigastrium, lasting 15 to 30 minutes or longer [4]. Early diagnosis and staging of acute cholecystitis enable rapid treatment and reduce mortality and morbidity [5]. C-reactive protein (CRP), white blood cell count (WBC), and platelet count (PLT) are well-known hematological and biochemical predictors of severe inflammation [2]. Acute cholecystitis is one of the most common complications associated with gallstones and exhibits varying degrees of severity, with early laparoscopic cholecystectomy being the currently recommended best treatment [1,6,7]. Only 5% of patients develop gallstone-related complications such as cholecystitis, cholangitis, or biliary pancreatitis, while the remaining 95% remain free of biliary complications [4]. Cholecystectomy is one of the most common surgical procedures with a low rate of complications. "Severe" complications occur in about 2% and 5% of laparoscopic and open surgeries, respectively [8]. Laparoscopic cholecystectomy for complicated cases of acute cholecystitis is associated with the risk of vasculobiliary injuries and requires good surgical skills [9]. The aim of this study is to compare preoperative variables in patients with acute cholecystitis, which are not only important for diagnosis but also have significance in determining the severity of acute cholecystitis in the preoperative period.

Materials and methods

The retrospective systematic research included all clinical cases diagnosed with acute cholecystitis in the period from January 2019 to December 2019, totaling 56 patients at CHC Kosovska Mitrovica. The sample size of the study was determined based on the number of respondents within the specified period. For the research, data from medical records were used for statistical analysis. The data collected for the study included age, sex, medical history, laboratory analyses (WBC, NE%, PLT, ALT, GGT, CRP, total bilirubin), and medical diagnosis (ultrasound examination).

Statistical analysis

The statistical data processing was performed using the software program SPSS Statistics 20 (SPSS INC, Chicago, IL, USA). All numerical values were reported as means (standard deviations), while categorical variables were presented as percentages. Statistical significance between frequencies was assessed using the chi-square test ($\chi 2$), with a criterion for statistical significance set at $P<0.05$.

Results

In this study, a total of 56 patients (mean age 53 years; 26 men and 30 women) were included. Among them, 32 patients (57.15%) had characteristics indicative of simple cholecystitis, while 24 patients (42.85%) had severe cholecystitis. Table 1 presents the comparison of preoperative variables between patients with simple cholecystitis and severe cholecystitis. The analysis revealed statistically significant differences in several variables, including white blood cells (WBC), percentage of neutrophils (NE%), platelets (PLT), alanine transaminase (ALT), gamma glutamyl transaminase (GGT), total bilirubin, C-reactive protein (CRP), and ultrasound findings, with all P-values being less than 0.05. Specifically, the group with severe cholecystitis consisted of older patients, with both sexes being equally represented. Furthermore, this group exhibited higher levels of WBC count, NE%, PLT, ALT, GGT, total bilirubin, and CRP compared to the group with simple cholecystitis ($P<0.05$).

Table 1: Demographic and preoperative characteristics of patients who underwent laparoscopic cholecystectomy for cholecystitis

	Total patients (n=56)	Simple cholecystitis (n=32)	Severe cholecystitis (n=24)	P-value
Age				0.187
Mean (SD)	51.57 (14.51)	49.34 (12.67)	54.54 (16.47)	
Median	52	52	52	
Gender				0.847
Male	26 (46.4%)	14 (43.75%)	12 (50%)	
Female	30 (53.6%)	18 (56.25%)	12 (50%)	
Comorbidity				0.243
Yes	36 (64.3%)	18 (56.25%)	18 (75%)	
No	20 (35.7%)	14 (43.75%)	6 (25%)	
DSBO				0.947
<a month	16 (28.6%)	9 (28.1%)	7 (29.2%)	
>3 month to a year	20 (35.7%)	11 (34.4%)	9 (37.5%)	
>a year	20 (35.7%)	12 (37.5%)	8 (33.3%)	
WBC				0.045
Mean (SD)	11.58 (5.05)	7.93 (1.99)	16.45 (3.50)	
Median	10.76	7.67	15.94	
NE%				0.038
Mean (SD)	74.01 (12.59)	65.64 (10.20)	85.17 (3.34)	
Median	78	66.67	84.90	
PLT				0.209
Mean (SD)	274.47 (60.22)	265.64 (57.80)	286.23 (62.59)	
Median	266.10	264.80	268.05	
ALT				0.041
Mean (SD)	56.94 (41.99)	30.00 (24.69)	94.91 (30.21)	
Median	42	23	89.50	
GGT				0.016
Mean (SD)	56.41 (41.89)	36.23 (29.64)	87.70 (39.18)	
Median	44	27	84	
Total bilirubin				0.031
Mean (SD)	13.92 (5.50)	10.47 (3.40)	19.19 (3.52)	
Median	14.10	10.75	18.40	
CRP				0.042
Mean (SD)	23.82 (24.13)	7.80 (4.74)	46.11 (22.47)	
Median	13.60	7.40	42.30	
Ultrasound findings				0.050
No changes	23 (41.1%)	23 (71.9%)	0 (0%)	
Distension	18 (32.1%)	6 (18.8%)	12 (50%)	
Layered wall	15 (26.8%)	3 (9.4%)	12 (50%)	

DSBO: duration of symptoms before operations

Then, specific variables were compared between groups (Table 2). These two groups showed significant differences in the use of drugs from the group "statins" and triglyceride values. Severe cholecystitis was associated with statin use (79.2%) and triglyceride values 1.55 (0.47), both variables showed a statistically significant association with severe cholecystitis ($P<0.05$) (Table 2).

Table 2: Correlation of preoperative characteristics of patients with calculous cholecystitis

	Total patients (n=56)	Simple cholecystitis (n=32)	Severe cholecystitis (n=24)	P-value
Statins preoperatively Yes No	28 (50%) 28 (50%)	9 (28.1%) 23 (71.9%)	19 (79.2%) 5 (20.8%)	0.026
Smoking status Yes No	34 (60.7%) 22 (39.3%)	17 (53.1%) 15 (46.9%)	17 (70.8%) 7 (29.2%)	0.286
Alcohol Don't use it ≤ 2 cups > 2 cups	29 (51.8%) 17 (30.4%) 10 (17.8%)	19 (59.4%) 9 (28.1%) 4 (12.5%)	10 (41.7%) 8 (33.3%) 6 (25%)	0.341
Cholesterol Mean (SD) Median	4.94 (1.63) 5.10	4.77 (1.68) 4.80	5.17 (1.57) 5.70	0.370
Triglycerides Mean (SD) Median	1.37 (0.53) 1.22	1.25 (0.54) 1.14	1.55 (0.47) 1.49	0.013
Ca$^+$ Mean (SD) Median	2.40 (1.66) 2.41	2.41 (0.12) 2.42	2.38 (0.22) 2.35	0.621

Discussion

It is indeed crucial to develop proficient identification skills for distinguishing between patients with a simple or severe form of acute cholecystitis. Possible solutions to achieve this goal include organizing campaigns to raise public awareness about the importance of seeking prompt medical consultation in cases of acute abdominal pain, establishing universal health coverage (including dietary aspects), and improving technical platforms for accurate diagnosis and treatment. CRP, being an independent and non-specific systemic marker for inflammation, correlates with the severity of surgical trauma, infection, and inflammation. Significant differences exist in the initial levels of CRP, WBC, and percentage of neutrophils (Ne%) [2]. The complicated form of cholecystitis is characterized by older age, higher WBC count, elevated neutrophil count, increased CRP levels, and ultrasound findings indicative of gallbladder abnormalities [10]. Ultrasound variables such as gallbladder wall thickness and stratification are more commonly observed in severe cholecystitis cases that require conversion to open surgery [1]. The prevalence of gallstones is significantly higher in women compared to men [9]. In previous studies, the average age of patients was reported to be 45.1 (11.1) years, with a majority of female patients [11]. The average total bilirubin value was 1 mg/dl (55.6 µmol/L), which is considerably higher than the average in our study, and no correlation was found between total bilirubin and the severity of cholecystitis. The average WBC was 12.6, which is approximately similar to the values observed in our study. On admission, CRP levels were reported to be 88.4, which does not align with our findings [12]. It is important to acknowledge the limitations of this study, including the small number of subjects with acute cholecystitis. Subjects diagnosed with chronic cholecystitis or gallbladder polyposis were excluded from the study, which may impact the generalizability of the findings.

Conclusion

Based on the analysis of anamnestic data, laboratory analyses, radiological diagnostics, and operative findings, a total of 56 patients were included in this study. Among them, 32 patients exhibited characteristics indicative of simple cholecystitis, while 24 patients had severe cholecystitis. The group with severe cholecystitis consisted of older patients, with both sexes being equally represented. Additionally, this group demonstrated higher levels of WBC, NE%, PLT, ALT, GGT, total bilirubin, and CRP. Imaging studies revealed significant distension, particularly in the gallbladder wall, in the group with severe cholecystitis. Furthermore, the use of statins and triglyceride levels of 1.55 (0.47) were significantly associated with severe cholecystitis. These variables can serve as risk factors for predicting severe cholecystitis with high accuracy in the preoperative period.

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