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The Role of the De Ritis Ratio in Acute Cholecystitis: A Retrospective Observational Study

De Ritis Oranının Akut Kolesistitteki Rolü: Retrospektif Gözlemsel Çalışma

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Abstract

Aim: Our primary aim was to evaluate the relationship between De-Ritis rate and short-term mortality in patients with cholecystitis. Our secondary aim was to evaluate the relationship between De-Ritis rate and short-term mortality in patients who underwent emergency surgery for acute cholecystitis.

Material and Method: This retrospective observational study was conducted on patients diagnosed with acute cholecystitis by laboratory parameters and ultrasound, and operated on who presented to the emergency medical clinic of University of Health Sciences, Ümraniye Education and Research Hospitalbetween June 1, 2020, and January 1, 2022. The relationship between De-Ritis rate and mortality was evaluated. The Statistical Package for Social Sciences (SPSS) software (v.20; Chicago, IL, USA) was used for all statistical analyses. All results with p < 0.05 were considered statistically significant.

Results: In our study, 174 patients were included, and 50.6% of our patients were women. The mean age was 59.0 (43.2 to 71.8). A total of 2.29% of our patients died. No statistically significant relationship was found between AST, ALT, CRP, albumin, and the De-Ritis ratio and mortality (p=0.584, p=0.533, p=0.517, p=0.07, p=0.399, respectively). When mortality rates in patients who underwent emergency surgery for acute cholecystitis were examined, no statistically significant correlation was found between AST, ALT, CRP, albumin, and De-Ritis rates and mortality (p=0.248, p=0.315, p=0.451, p=0.183, p=0.688, respectively)

Conclusion: De-Ritis rate was not found to be associated with mortality in patients with acute cholecystitis. De-Ritis rate was not associated with mortality in emergency operated patients who underwent emergency surgery for acute cholecystitis.

Keywords: Cholecystitis, AST, ALT, De-Ritis ratio

Öz

Amaç: Çalışmamızda primer amacımız kolesistit tanılı hastalarda De-Ritis oranı ile kısa dönem mortalite arasındaki ilişkiyi değerlendirmek idi. Sekonder amacımız ise akut kolesistit nedeni ile acil opere olan hastalarda De-Ritis oranının kısa dönem mortalite ile ilişkisini değerlendirmek idi.

Gereç ve Yöntem: Bu retrospektif gözlemsel çalışma, 1 Haziran 2020 ile 1 Ocak 2022 tarihleri arasında Sağlık Bilimleri Üniversitesi Ümraniye Eğitim ve Araştırma Hastanesi acil servisine başvuran, labaratuvar parametreleri ve ultrason ile akut kolesistit tanısı alan hastalar ve ameliyat edilen hastalar üzerinde yapılmıştır. De-Ritis oranının mortalite ile ilişkisi değerlendirildi. Statistical Package for Social Sciences (SPSS) yazılımı (v.20; Chicago, IL, ABD) tüm istatistiksel analizler için kullanıldı. p < 0.05 olan tüm sonuçlar istatistiksel olarak anlamlı kabul edildi.

Bulgular: Çalışmamıza 174 hasta dahil edildi ve hastalarımızın %50,6'sı kadındı. Ortalama yaş 59.0 (43.2 ila 71.8) idi. Hastalarımızın toplam %2,29'u vefat etti. AST, ALT, CRP, albumin ve De-Ritis oranı ile mortalite arasında istatistiksel olarak anlamlı bir ilişki bulunmadı (sırası ile p=0,584, p=0,533, p=0,517, p=0,07, p=0,399). Akut kolesistit nedeni ile acil opere olan hastalarda mortalite oranları incelendiğinde AST, ALT, CRP, albumin ve De-Ritis oranları ile mortalite arasında istatistiksel olarak anlamlı bir ilişki bulunmadı (sırası altı, CRP, albumin ve De-Ritis oranları ile mortalite arasında istatistiksel olarak anlamlı bir ilişki bulunmadı (sırası ile p=0,248, p=0,315, p=0,451, p=0,183, p= 0.688)

Sonuç: De-Ritis oranı akut kolesistit tanılı hastalarda mortalite ile ilişkili bulunmadı. Aku kolesistit nedeni ile acil opere olan hastalarda da De-Ritis oranı mortalite ile ilişkili değildi.

Anahtar Kelimeler: Kolesistit, AST, ALT, De-Ritis oranı

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INTRODUCTION

Cholecystitis is an emergency surgical disease that may present with mild clinical symptoms or severe clinical findings, such as cholangitis and pancreatitis, characterized by gallbladder inflammation. An essential part of these is caused by gallstones.^[1] The diagnosis is made by specific physical examination findings, laboratory tests, and radiological imaging techniques. The Tokyo criteria (TG18 Diagnostic Criteria and Severity Grading of Acute Cholecystitis) took their last updated form in 2018 and are still used in diagnosing cholecystitis.^[2] C-reactive protein^[3], neutrophil, lymphocyte^[4] are well known systemic inflammatory biomarkers. Occurring after an inflammatory process, the effects of hematological parameters such as WBC (white blood cell), neutrophil, lymphocyte^[5], C-reactive protein^[6], hematological inflammatory indices^[7], and CRP/albumin ratio^[8] on the prognosis in patients with cholecystitis have been the subject of studies.

ALT (alanine aminotransferase), one of the clinical laboratory tests, is an aminotransferase from the enzyme group that reversibly catalyzes the conversion of alpha ketoacids to amino acids. It is active in the heart and skeletal muscle along with the liver, but specific ALT activity in the liver is more effective than in the heart and skeletal muscle. It is found in hepatocytes, and its height indicates a defect in the hepatocyte plasma membrane. AST (aspartate aminotransferase) is found mainly in the liver and skeletal muscle, brain, heart, lung, kidney, pancreas, leukocytes, and erythrocytes. It increases in skeletal muscle destruction and cardiac damage, particularly in liver diseases.^(9,10)

The De-Ritis ratio (AST/ALT ratio) was first used by Fernando De Ritis in 1957^[11], and the De-Ritis ratio began to be used in viral hepatitis, alcoholic hepatitis, and ischemic hepatitis. ^[12] The effect of the De-Ritis ratio, which is thought to be an indicator of liver damage, on the prognosis has been evaluated in various studies.^[13-16] In patients with sepsis^[13], patients with intestinal lung disease^[14] and patients with COVID-19^[15,16], patients diagnosed with cancer^[17-25], and patients with clinical conditions and ischemic processes, for example, patients with cardiac arrest^[26], patients with acute myocardial infarction^[27] and patients with kidney damage during percutaneous coronary angiography^[28], the effect of the De-Ritis ratio on prognosis was discussed. To the best of our knowledge, there have been no studies in the literature on the effect of the De-Ritis ratio on prognosis in patients with cholecystitis.

Aim

Our primary aim was to evaluate the relationship between De-Ritis rate and short-term mortality in patients with cholecystitis. Our secondary aim was to evaluate the relationship between De-Ritis rate and short-term mortality in patients who underwent emergency surgery for acute cholecystitis.

MATERIALS AND METHOD

Study Design

This retrospective cross-sectional observational study was conducted on patients diagnosed with AC who presented to the emergency medical clinic of University of Health Sciences, Ümraniye Education and Research Hospital between June 1, 2020, and January 1, 2022. Our hospital is a tertiary education and research institute with approximately 840 beds, receiving 2.9 million presentations per year. However, there are 600,000 applications per year to the emergency department.

Study population

This study included patients aged ≥ 18 years with clinically, radiologically, and laboratory-confirmed acute cholecystitis diagnoses and hemogram and biochemical parameters measured and registered by the Emergency Department. Patients aged <18 years, those with a history of trauma, incomplete data, patients whose mortality information could not be reached, and patients who died due to a reason other than cholecystitis or cholecystitis complication who refused to participate in the study were excluded.

Data Collection

The data of patients admitted to the emergency department and diagnosed with cholecystitis were collected retrospectively. These data included demographic characteristics, age, sex, comorbid diseases, laboratory findings (neutrophils, lymphocytes, eosinophils, basophils, platelets, WBCs (white blood cells), hemoglobin, hematocrit, mean platelet volume, mean corpuscular volume, C-reactive protein, total, direct, indirect bilirubin, BUN (blood urea nitrogen), creatinine, AST, ALT, De Ritis ratio (AST/ALT), length of hospital stay (LOS) and mortality. The radiological technique we used in the diagnosis was ultrasound. Emergency operated and non-operated patients were also examined. The patients were divided into two groups—nonsurvivors and survivors based on their status in Turkey's National Death Notification System. The nonsurvivor group consisted of cholecystitisrelated deaths, and 30-day mortality was recorded. Intensive care unit admission rates and length of hospital stay were recorded using the hospital's data system.

The Tokyo Guidelines 2013 (TG13) and The Tokyo Guidelines 2018 (TG 18) severity grading for acute cholecystitis

"Grade III (severe)" acute cholecystitis is associated with dwysfunction of any one of the following organs/systems:

- 1. Cardiovascular dysfunction: hypotension requiring treatment with dopamine $\geq 5 \ \mu g/kg$ per min, or any dose of norepinephrine.
- 2. Respiratory dysfunction: PaO₂/FiO₂ ratio <300.
- 3. Neurological dysfunction: decreased level of consciousness.
- 4. Renal dysfunction: oliguria, creatinine >2.0 mg/dl.
- 5. Hematological dysfunction: platelet count <100,000/mm³.

6. Hepatic dysfunction: PT-INR > 1.5.

"Grade II (moderate)" acute cholecystitis is associated with any one of the following conditions:

- 1. Palpable tender mass in the right upper abdominal quadrant.
- 2. Elevated WBC count (>18,000/mm³).
- 3. Duration of complaints >72 hours.
- Marked local inflammation (gangrenous cholecystitis, pericholecystic abscess, hepatic abscess, biliary peritonitis, emphysematous cholecystitis).

"Grade I (mild)" acute cholecystitis does not meet the criteria of "Grade III" or "Grade II" acute cholecystitis. It can also be defined as acute cholecystitis in a healthy patient with no organ dysfunction and mild inflammatory changes in the gallbladder, making cholecystectomy a safe and low-risk operative procedure.

Statistical Analysis

The Statistical Package for Social Sciences (SPSS) software (v.20; Chicago, IL, USA) was used for all statistical analyses. All results with p < 0.05 were considered statistically significant. The normality of continuous data was assessed using the Shapiro–Wilk test. Categorical variables are presented as numbers (percentages), continuous variables are presented as medians (ranges), and quantitative variables are presented as medians (interquartile ranges; 25th-75th percentiles). Categorical data were compared using Chi-square tests and Fisher's exact tests. Continuous data were compared pairwise using Mann–Whitney tests.

Ethics

The study was conducted with the permission of the University of Health Sciences, Ümraniye Education and Research Hospital Ethics Committee (Date: 20/10/2022, Decision No: B.10.1.TKH.4.34.H.GP.0.01/322). The ethical rules and the principles of the Declaration of Helsinki performed out all procedures.

RESULTS

In our study, 174 patients were included, and 50.6% of our patients were women. The mean age was 59.0 (43.2 to 71.8). A total of 2.29% of our patients died. Coronary artery disease and chronic renal failure, which are comorbid diseases, had a statistically significant relationship with mortality (p=0.006, p=0.007, respectively). It was determined that there was a statistically significant relationship between low hemoglobin and hematocrit and mortality. (p=0.006, p=0.003, respectively). No statistically significant relationship was found between AST, ALT, CRP, albumin, and the De-Ritis ratio and mortality (p=0.584, p=0.533, p=0.517, p=0.07, p=0.399, respectively). The demographic characteristics and laboratory findings of the patients are given in **Table 1**.

A total of 39.66% of our patients underwent surgery. Only

one patient died from the operation (1.4%). No statistically significant correlation was found between comorbid diseases and the patients being operated on (**Table 2**). There was no statistically significant relationship between AST, ALT, CRP, albumin, and the De-Ritis ratio and mortality between operated and non-operated patients (p=0.069, p=0.095, p=0.353, p=0.535, p=0.89, respectively). (**Table 2**)

When mortality rates in operated patients were examined, no statistically significant correlation was found between AST, ALT, CRP, albumin, and De-Ritis rates and mortality (p=0.248, p=0.315, p=0.451, p=0.183, p=0.688, respectively) (**Table 3**). No statistically significant correlation was found between AST, ALT, CRP, albumin and De-Ritis rates and mortality in patients who underwent surgery and had a hospital stay longer than seven days (p=0.668, p=0.610, p=0.835, p=0.303, p=0.871, respectively).

DISCUSSION

Our study found that the De-Ritis ratio in patients diagnosed with cholecystitis was statistically insignificant in predicting mortality. AST, ALT, albumin, and CRP levels were also ineffective in predicting mortality in all patients. Additionally, the De-Ritis ratio was not associated with surgical operations in patients with cholecystitis. There was no difference in the De Ritis ratio in patients who underwent surgery compared to patients who did not undergo surgery. Our study showed that the De-Ritis ratio has no prognostic significance in cholecystitis patients. According to the Tokyo guidelines classification, in our study, it was observed that grade III did not have superiority over other grades in terms of mortality. To the best of our knowledge, no study has examined the relationship between cholecystitis and the De-Ritis ratio.

In addition, the relationship between the De-Ritis ratio and patient prognosis in sepsis^[13], lung diseases^[14,16], and cancers^[17] was examined. The effect of the De-Ritis ratio on the prognosis in patients with sepsis progressing with an inflammatory process was investigated, and Schupp et al. found that the De-Ritis ratio and bilirubin values on the 1st, the third, fifth, and seventh days were associated with mortality in patients with septic shock. On the 30th day, although it could determine mortality, the De-Ritis ratio was observed to be superior in determining mortality compared to bilirubin values.^[13] In a retrospective study, the De-Ritis ratio was found to be a predictive factor for mortality in patients with intestinal lung disease-related polymyositisdermatomyositis.^[14] In a study conducted on patients diagnosed with COVID-19, the De-Ritis ratio was found to be statistically significantly higher in patients diagnosed with COVID-19 than in healthy people.^[15] In a study conducted on patients diagnosed with COVID-19 with respiratory disease, similar to our study, no statistically significant relationship was found between having a history of liver disease or elevated AST and ALT and mortality. However, it was found that there was a statistically significant relationship between a high De-

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Alchemer3.0 (1%)3.0 (1%)3.0 (1%)0.0 (1%)Chonolystuctive Pulseope0.0 (5%)0.0 (0%)0.0 (0%)0.0 (0%)Atma15.0 (8%)0.0 (0%)0.0 (0%)0.0 (0%)Atma0.0 (0%)0.0 (0%)0.0 (0%)0.0 (0%)Choncena Failure0.0 (5%)0.0 (0%)0.0 (0%)0.0 (0%)Choncena Failure0.0 (0%)0.0 (0%)0.0 (0%)0.0 (0%)Choncena Fail	Malignancy	3.0 (1.8%)	0.0 (0.0%)	3.0 (1.7%)	0.789			
Chronic Obstructive Pulmonary Disease10.0(5%)11.0(5.3%)0.010Coronary artery disease32.0(18.0%)3.0(0.0(0%)3.0.0(2.1%)0.000Nathma9.0(5.3%)0.00(0.0%)9.0(5.2%)0.000Chronic Renal Failure4.0(2.4%)0.0(0.0%)9.0(5.2%)0.000Chronic Renal Failure4.0(2.4%)0.0(0.0%)9.0(5.2%)0.000Chronic Renal Failure4.0(2.4%)0.0(0.0%)0.0(0.0%)0.000Chronic Renal Failure12.0(1.5,0.2)9.7(6.1.1)12.9(1.3,1.6.2)0.100Chronic Renal Failure10.0(0.0,0.1)0.0(0.0,0.1)0.0(0.0,0.1)0.0(0.0,0.1)0.0(0.0,0.1)Neurophil (103µ/L)16.1(1.0.2.2)11.0(9.1.5)16.1(1.0.2.1)0.0000.000Noncycle (103µ/L)16.1(1.0.2.1)10.0(0.0.0)0.0(0.0.0)0.0(0.0.0)0.0000.000Resophil0.0(0.0.0.0)0.0(0.0.0)0.0(0.0.0)0.0(0.0.0)0.0(0.0.0)0.0000.000Resophil0.0(0.0.0.0)0.0(0.0.0)0.0(0.0.0)0.0(0.0.0)0.0(0.0.0)0.0(0.0.0)0.0(0.0.0)Resophil0.0(0.0.0)0.0(0.0.0)0.0(0.0.0)0.0(0.0.0)0.0(0.0.0)0.0(0.0.0)0.0(0.0.0)Resophil0.0(0.0.0)0.0(0.0.0)0.0(0.0.0)0.0(0.0.0)0.0(0.0.0)0.0(0.0.0)0.0(0.0.0)Resophil0.0(0.0.0)0.0(0.0.0)0.0(0.0.0)0.0(0.0.0)0.0(0.0.0)0.0(0.0.0)0.0(0.0.0)Resophil0.0(0.0.0)0.0(0.0.0)0.0(0.0.0) <td< td=""><td>Alzheimer</td><td>3.0 (1.8%)</td><td>0.0 (0.0%)</td><td>3.0 (1.7%)</td><td>0.789</td></td<>	Alzheimer	3.0 (1.8%)	0.0 (0.0%)	3.0 (1.7%)	0.789			
Cononay artery disease3.20 (18.8%)3.0 (75.0%)3.50 (20.1%)0.00Arthan1.50 (8.6%)0.0 (0.0%)1.50 (8.6%)0.63 (7.6%)Heart Failure4.0 (2.4%)1.0 (2.5%)0.50 (2.9%)0.0 (0.7%)Chroinc Renal Failure4.0 (2.4%)1.0 (2.5%)0.0 (0.5%)0.0 (0.7%)Laboratury parameters Median (19.2%)2.2 (10.5 16.2)9.7 (8.6 - 1.1)0.2 (2.10, 1.6, 1.2)0.12 (2.10, 1.6, 1.2)Neutrophil (103µ/L)1.0 (10.6 - 1.1)0.1 (0.6 (1.1)0.1 (0.6 (1.1)0.1 (0.6 (1.1))0.1 (0.6 (1.1))0.1 (0.6 (1.1))0.1 (0.6 (1.1))0.1 (0.6 (1.1))0.1 (0.6 (1.1))0.0 (0.6 (0.1))0.0 (0.6 (0.1))0.0 (0.6 (0.1))0.0 (0.6 (1.1))0.0 (0.6	Chronic Obstructive Pulmonary Disease	10.0 (5.9%)	1.0 (25.0%)	11.0 (6.3%)	0.120			
Ashma15.0 (8.9%)0.0 (0.0%)15.0 (8.0%)0.5.1 (8.0%)Hear Faire0.0 (5.0%)0.0 (0.0%)0.0 (5.0%)0.0 (0.0%)Crechovascial Disease0.0 (0.0%)0.0 (0.0%)0.0 (0.0%)0.0 (0.0%)Loctatury parmeters Median (US)12.0 (0.0 (0.0 (0.0 (0.0 (0.0 (0.0 (0.0 (Coronary artery disease	32.0 (18.8%)	3.0 (75.0%)	35.0 (20.1%)	0.006			
Hant Failure9.0 (S3%)0.0 (0.0%)9.0 (S.%)0.0 (S.%)Chonckenal Failure4.0 (2.%)0.0 (0.%)0.0 (S.%)0.0 (S.%)Cherborxscular Disease0.0 (S.%)0.0 (S.%)0.0 (S.%)0.0 (S.%)Laboratury parameters Median (UK)9.7 (S.6.1.0)0.7 (S.6.1.0)0.7 (S.6.1.0)0.7 (S.6.1.0)0.0 (S.6.1.0)Noncoyce (IO3µ/L)1.0 (S.0.1.0)0.7 (S.6.1.0)0.7 (S.6.1.0)0.0 (S.6.1.0)0.0 (S.6.1.0)0.0 (S.6.1.0)Noncoyce (IO3µ/L)0.7 (S.6.0.0)0.0 (S.6.1.0)0.0 (S.6.1.0)0.0 (S.6.1.0)0.0 (S.6.1.0)0.0 (S.6.1.0)Noncoyce (IO3µ/L)0.1 (S.6.1.0)0.0 (S.6.1.0)0.0 (S.6.1.0)0.0 (S.6.1.0)0.0 (S.6.1.0)0.0 (S.6.1.0)Noncoyce (IO3µ/L)0.1 (S.6.1.0)0.0 (S.6.1.0)0.0 (S.6.1.0)0.0 (S.6.1.0)0.0 (S.6.1.0)0.0 (S.6.1.0)Sasphi0.0 (S.6.1.0)0.0 (S.6.1.0)0.0 (S.6.1.0)0.0 (S.6.1.0)0.0 (S.6.1.0)0.0 (S.6.1.0)Noncot (IO3µ/L)0.1 (S.6.1.0.0)0.1 (S.6.1.0.0)0.0 (S.6.1.0.0)0.0 (S.6.1.0.0)0.0 (S.6.1.0.0)Noncot (IO3µ/L)0.1 (S.6.1.0.0)0.1 (S.6.1.0.0)0.0 (S.6.1.0.0)0.0 (S.6.1.0.0)0.0 (S.6.1.0.0)Noncot (IO3µ/L)0.1 (S.6.1.0.0)0.1 (S.6.1.0.0)0.0 (S.6.1.0.0)0.0 (S.6.1.0.0)0.0 (S.6.1.0.0)Noncot (IO3µ/L)0.1 (S.6.1.0.0.0)0.1 (S.6.1.0.0.0)0.0 (S.6.1.0.0.0)0.0 (S.6.1.0.0.0.0)0.0 (S.6.1.0.0.0.0)Noncot (IO3µ/L)0.1 (S.6.1.0.0.0.0.0.0.0)0.1 (S.6.1.0.0.0.0.0.0.0.0.0.0.0.0.0.0	Asthma	15.0 (8.8%)	0.0 (0.0%)	15.0 (8.6%)	0.534			
Chrone Renal Failure4.0 (2.4%)1.0 (2.5%)5.0 (2.9%)0.000Corechovacular Disease10.0 (2.9%)0.0 (0.0 (0.0 (0.0 (0.0 (0.0 (0.0 (0.0	Heart Failure	9.0 (5.3%)	0.0 (0.0%)	9.0 (5.2%)	0.637			
Cerebroxacular Disease100 (5%)0.0 (0.%)10.0 (5.%)0.0 (5.%)Laboratury parameters Median (UR)12.9 (0.3 (5.4) (3.6	Chronic Renal Failure	4.0 (2.4%)	1.0 (25.0%)	5.0 (2.9%)	0.007			
Laboratuary parameters Median (UR)12 gP(10.5 hG.)9.7 (8 c H)12 (9 (10.3 µL)0.1 (2 (10.3 µL)Neutrophil (103µL)10.5 (0.2 + 1.3 µL)1.7 (9.6 + 0.0)1.6 (10.2 µL)0.7 (0.6 + 0.0)Monocyte (103µL)1.6 (10.2 µL)1.1 (0.9 + 1.5 µL)1.6 (10.2 µL)0.7 (0.6 + 0.0)Lomphotyte (103µL)1.6 (10.0 + 0.1)0.0 (0.0 + 0.0)0.0 (0.0 + 0.0)0.7 (0.6 + 0.0)Basophil0.0 (0.0 + 0.0)0.0 (0.0 + 0.0)0.0 (0.0 + 0.0)0.0 (0.0 + 0.0)Basophil0.6 (6.4 + 5.0)3.2 (12.3 + 1.4)0.7 (20.3 + 1.5)4.6 (4.3 + 0.0)RBC4.6 (4.3 + 5.0)3.0 (20.3 + 1.5)4.6 (1.4 + 0.0)0.0 (0.0 + 0.0)Hematokit (%)4.6 (3.5 0, 4.2)3.0 (20.3 + 1.5)4.6 (3.5 + 0.0)0.0 (0.0 + 0.0)PMC (f)1.6 (1.5 + 0.5) H) (1.6 + 1.6)1.6 (1.6 + 0.5)0.6 (1.6 + 0.0)0.6 (1.6 + 0.0)PMC (f)1.6 (1.5 + 0.5) H) (1.0 + 1.0)1.6 (1.6 + 0.0)0.6 (1.6 + 0.0)0.6 (1.6 + 0.0)PMC (f)1.6 (1.5 + 0.5) H) (1.0 + 1.0)1.6 (1.6 + 0.0)0.6 (1.6 + 0.0)0.6 (1.6 + 0.0)PMC (f)1.6 (1.5 + 0.5) H) (1.0 + 1.0)1.6 (1.6 + 0.0)0.6 (1.6 + 0.0)0.6 (1.6 + 0.0)PMC (f)1.6 (1.5 + 0.5) H) (1.0 + 1.0)1.6 (1.6 + 0.0)0.6 (1.6 + 0.0)0.6 (1.6 + 0.0)PMC (f)1.6 (1.5 + 0.5) H) (1.0 + 1.0)1.6 (1.6 + 0.0)0.6 (1.6 + 0.0)0.6 (1.6 + 0.0)PMC (f)1.6 (1.6 + 0.0)1.6 (1.6 + 0.0)1.6 (1.6 + 0.0)0.6 (1.6 + 0.0)PMC (f)1.6 (1.6 + 0.0)1.6 (1.6 + 0.0) <td>Cerebrovascular Disease</td> <td>10.0 (5.9%)</td> <td>0.0 (0.0%)</td> <td>10.0 (5.7%)</td> <td>0.617</td>	Cerebrovascular Disease	10.0 (5.9%)	0.0 (0.0%)	10.0 (5.7%)	0.617			
WBC(103µ/1)129(10.5·16.2)9.7 (8.6·10.9)129(10.3·16.2)0.12Neurophl (103µ/1)10.5 (8.2·13.6)7.9 (6.6·10.0)10.5 (8.0·13.6)0.28Monocyte (103µ/1)16.1 (0-2.2)1.1 (0-1.5)16.1 (0-2.2)0.20Edsinphi0.0 (0.0.0)0.0 (0.0.0)0.0 (0.0.0)0.0 (0.0.0)0.0 (0.0.0)Basophi0.0 (0.0.0)0.0 (0.0.0)0.0 (0.0.0)0.0 (0.0.0)0.0 (0.0.0)RC4.6 (4.3.5.0)3.2 (3.0.3.5)4.6 (4.3.5.0)0.00Hematokir (%)0.4 (3.6,1.7.4.3)0.02 (3.2.3.3.3)4.0 (3.7.4.3.4)0.00MCV (f)8.6 (3.5.0.4.2.0)9.6 (3.0.2.3.3)4.0 (3.7.4.3.4)0.10RDW (f)13.6 (1.3.1.4.4)14.4 (13.8.1.5.1)13.6 (1.3.1.4.4)0.17.5Platelet (103µ/1)13.6 (1.3.1.4.3.4)14.0 (13.8.1.5.1)13.6 (1.3.1.4.4)0.6.02PDW (%)ALT (U/L)14.0 (13.6.1.2.5.1)16.1 (1.6.06.02/2.1.5.1)0.6.03.030.6.02ADunin (g/d)3.6 (3.0.4.2.0)3.4 (3.6.4.2.3.6)0.6.020.6.02ADunin (g/d)3.6 (1.0.1.5.1)1.1 (0.6.1.4)0.6.07.1.10.5.01ADUng/d)3.6 (1.0.1.5.0)1.1 (0.6.1.4)0.6.07.1.10.102ADU (g/d)3.6 (1.0.1.5.0)1.1 (0.6.1.4)0.6.07.1.10.102ADU (g/d)3.6 (1.0.1.5.0)1.1 (0.6.1.4)0.6.07.1.10.102ADU (g/d)3.6 (1.0.1.5.0)1.6 (1.0.1.4)0.6.07.1.10.102ADU (g/d)3.6 (1.0.1.5.0)1.6 (1.0.1.4)0.6.07.1.10.102<	Laboratuary parameters Median (IQR)							
Netrophil(103µL)105 (8:2+13.0)79 (6:6+0.0)105 (8:0-13.0)0.268Monocyte(103µL)0.7 (0.5-0.0)0.7 (0.5-0.0)0.7 (0.5-0.0)0.928Lymphocyte(103µL)1.6 (1.0-2.2)1.1 (0.9-1.0)0.1 (0.0-0.1)0.7 (0.5-0.0)Basophil0.0 (0.0-0.0)0.0 (0.0-0.0)0.0 (0.0-0.0)0.0 (0.0-0.0)Basophil0.0 (0.0-0.0)0.0 (0.0-0.0)0.0 (0.0-0.0)0.0 (0.0-0.0)MCV(f)0.3 (1.0 (1.0.1)0.6 (0.2 (1.0.1)0.6 (1.0.1)0.6 (2.0.1)Platel(103µL)162 (1.5 + 16.5) 151 (0.1 (1.0.1)162 (1.5 + 16.5) 151 (0.1 (1.0.1)0.6 (2.0.1)Platel(104µL)162 (1.5 + 16.5) 151 (0.1 (1.0.1)162 (1.5 + 16.5) 151 (0.1 (1.0.1)0.6 (2.0.1)Platel(104µL)162 (1.5 + 16.5) 151 (0.1 (1.0.1)162 (1.5 + 16.5) 151 (0.1 (1.0.1)0.6 (1.0.1)Platel(104µL)162 (1.5 + 16.5) 151 (0.1 (1.0.1)162 (1.5 + 16.5) 151 (0.1 (1.0.1)0.6 (1.0.1)Platel(104µL)162 (1.5 + 16.5) 151 (0.1 (1.0.1)162 (1.0.1.1)0.01 (1.0.1)<	WBC (103µ/L)	12.9(10.5- 16.2)	9.7 (8.6 -11.9)	12.9 (10.3-16.2)	0.182			
Monocyte (103µ/L)0.7 (0.5-0.9)0.7 (0.6-0.8)0.7 (0.5-0.9)0.928Lymphocyte (103µ/L)1.6 (1.0-2.2)1.1 (0.9-1.5)1.6 (1.0-2.2)0.306Basophil0.0 (0.0-0.0)0.0 (0.0-0.0)0.0 (0.0-0.0)0.0 (0.0-0.0)0.0 (0.0-0.0)Basophil0.0 (0.0-0.0)0.0 (0.0-0.0)0.0 (0.0-0.0)0.0 (0.0-0.0)0.0 (0.0-0.0)BRC4.6 (4.3-5.0)3.2 (3.0-3.5)4.6 (4.3-5.0)0.000Hemoglobin (g/dl)13.2 (12.3-14.4)9.7 (9.0-10.9)13.2 (12.3-14.4)0.000Hemoglobin (g/dl)13.2 (12.3-14.4)9.6 (8.6 - 10.5)8.6 (7.63.9-90.1)0.000MCV (f)6.6 7 (83.9-90.1)9.6 (8.6 - 10.5)8.6 (7.63.9-90.1)0.6 (7.6 - 10.6)Platelet (103µ/L)13.6 (13.0-14.4)14.4 (13.8 - 15.1)13.6 (13.1-14.4)0.600Platelet (103µ/L)9.4 (8.10.3)9.6 (9.2 - 10.1)9.6 (8.6 - 10.5)0.6 (7.6 - 10.6)Platelet (103µ/L)16.2 (15.9 - 16.5) 13.0 (17.0 - 12.0)0.6 (13.1 - 14.6)0.6 (13.1 - 14.6)0.6 (13.1 - 14.6)Platelet (103µ/L)16.2 (15.9 - 16.5) 13.0 (17.0 - 12.6)16.2 (15.9 - 16.5) 13.5 (17.1 - 12.8)0.6 (13.1 - 14.6)0.6 (13.1 - 14.6)Platelet (103µ/L)16.2 (15.9 - 16.5) 13.0 (17.0 - 12.6)16.2 (15.9 - 16.5) 13.5 (17.1 - 12.8)0.6 (13.1 - 14.6)0.6 (13.1 - 14.6)Platelet (103µ/L)16.2 (15.9 - 16.5) 13.0 (17.0 - 12.6)16.2 (15.9 - 16.5) 13.5 (17.1 - 12.8)0.6 (13.1 - 14.6)0.6 (13.1 - 14.6)Platelet (103µ/L)16.2 (15.9 - 16.5) 13.0 (17.0 - 12.6)16.0 (13.1 - 14.6) <td< td=""><td>Neutrophil (103µ/L)</td><td>10.5 (8.2-13.6)</td><td>7.9 (6.6-10.0)</td><td>10.5 (8.0-13.6)</td><td>0.265</td></td<>	Neutrophil (103µ/L)	10.5 (8.2-13.6)	7.9 (6.6-10.0)	10.5 (8.0-13.6)	0.265			
lymphocyte (103µL)1.6 (1.0-2.0)1.1 (0.9-1.5)1.6 (1.0-2.0)0.3 (0.0Bosophil0.1 (0.0-0.1)0.0 (0.0-0.0)0.0 (0.0-0.0)0.0 (0.0-0.0)0.5 (1.0Basophil0.0 (0.0-0.0)0.0 (0.0-0.0)0.0 (0.0-0.0)0.0 (0.0-0.0)0.0 (0.0-0.0)0.0 (0.0-0.0)BRC0.4 6 (4.3-5.0)3.2 (3.0-3.5)4.6 (4.3-5.0)0.0000.0 (0.0-0.0)0.0 (0.0-0	Monocyte (103µ/L)	0.7 (0.5-0.9)	0.7 (0.6-0.8)	0.7 (0.5-0.9)	0.928			
Edsnophil0.1 (0.0-0.1)0.0 (0.0-0.0)0.1 (0.0-0.1)0.758Basophil0.0 (0.0-0.0)0.0 (0.0-0.0)0.0 (0.0-0.0)0.0 (0.0-0.0)0.01RBC4.6 (4.3-5.0)3.2 (2.3 -4.3.4)9.7 (9.0.10)13.2 (2.3 -1.4.4)0.000Hematokit (%)13.2 (1.2.3 -1.4.4)9.7 (9.0.10)13.2 (2.3 -1.4.4)0.000MCV (f)6.5 (3.3.9-0.1)9.6 (8.2.1.0)6.6 (7.8.3-90.3)0.161RDW (f)13.6 (1.3.0 -1.4.4)14.4 (1.3.8 -1.5.1)13.6 (1.3.1 -1.4.4)0.175Platelet (103µL)247.5 (207.5 -31.3)21.05 (181.8-277.5)247.0207.3 1.0.00.460MPV (f)9.4 (8.6 -10.3)9.6 (9.2 -10.1)9.5 (8.6.1 0.3.)0.767PDW (h)ALT (U/L)16.2 (15.9 -16.5)1.1 (0.7.1.1)16.2 (15.9 -16.5)1.5 (7.1.2.3)0.4020.53Albumin (g/d)3.6 (3.5.0 - 42.0)16.2 (15.2 - 16.3.1.5 (7.1.2.3)0.6330.618CFR (mg/m)3.5 (11.0 - 150.2)12.9 (2.4.2.3.4.2.)3.4 (12.0 - 10.4.1.1)0.633GAT (U/L)3.2 (12.3.5 40.7.1)12.0 (2.4.1.1)0.4030.403UN (mg/dL)0.8 (0.7.1.1)1.0 (0.7.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.	Lymphocyte (103µ/L)	1.6 (1.0-2.2)	1.1 (0.9-1.5)	1.6 (1.0-2.2)	0.396			
Basphil0.0 (0.0.0.)0.0 (0.0.0.)0.0 (0.0.0.)0.0 (0.0.0.)RC4.6 (4.3.5.)3.2 (0.3.3.)4.6 (4.3.5.)0.003Henoglobin (g/d)13.2 (12.3.14.4)9.7 (9.0.10.)13.2 (12.3.14.4)0.004Henoglobin (g/d)4.0 (3.3.7.43.6)3.0.8 (28.3.3.)4.0 (3.7.43.3)0.003MCV (f)6.6 7 (83.9.90.1)9.6 (8.6.10.5.)8.6 7 (83.9.90.1)0.164RDW (f)13.6 (13.0.14.4)14.4 (13.8.1.7)13.6 (13.1.14.4)0.470Plaetet (103µ/L)47.5 (20.7.5.31)21.0 (18.8.27.7.5)247.0 (20.3.10.1.1.1.1)0.633MV (f)9.4 (8.6.10.3)9.6 (9.2.1.0.1)9.5 (8.6.1.1.1.1.1.1.1)0.6330.671Plaetet (103µ/L)16.2 (15.1-6.5.31.1.0.1.7.0.1.1.1)16.3 (15.1-6.6.6.0.2.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1	Eosinophil	0.1 (0.0-0.1)	0.0 (0.0-0.1)	0.1 (0.0-0.1)	0.758			
RBC4.6 (4.3-5.0)3.2 (3.0-5.1)4.6 (4.3-5.0)0.001Hemogloin (g/d)13.2 (1.2.3-14.4)9.7 (9.0-10.9)13.2 (1.2.3-14.4)0.000Hematokrit (%)4.0.3 (3.7.4.3.6)3.0.8 (29.3-3.3)4.0.0 (3.7.4.3.5)0.003MCV (f)8.6 7 (83.9.9.0.1)9.6 (8.8-10.5)8.67 (83.9.9.0.3)0.101RDW (f)13.6 (1.3.0.14.4)14.4 (1.3.15.1)13.6 (1.3.1.14.4)0.77Platelet (103µ/L)4.7.5 (20.7.5.13)2.0.5 (18.8.277.5)2.47.0 (20.7.31.0)0.673PDW (%)ALT (IU/L)16.2 (15.9-16.5) (1.0.1.12.0)16.3 (1.6.1.66.60 (27.0.1.5)16.2 (15.9.4.5.0.3)0.707PDW (%)ALT (IU/L)16.2 (15.9-16.5) (1.0.1.2.0)3.4.5 (28.6.37.2)3.4.1 (25.9.4.5.0.3)0.630Albumin (g/d)3.8.5 (35.0.4.2.0)3.4.5 (28.6.37.2)3.4.0 (22.1.5.8.1)0.630AST (IU/L)3.8.5 (35.0.4.2.0)3.4.5 (28.6.37.2)3.4.0 (21.0.5.8.1)0.617ST (IU/L)3.8.5 (35.0.4.2.0)3.4.5 (28.6.37.2)3.4.0 (21.0.5.8.1)0.618C (W) (m)(d)3.6.3 (1.1.0.15.0)1.2.0 (21.0.2.8.1)0.6180.618C (10.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.	Basophil	0.0 (0.0-0.0)	0.0 (0.0-0.0)	0.0 (0.0-0.0)	0.951			
Hemoglobin (g/d)13.2 (12.3-14.4)9.7 (9.0-10.9)13.2 (12.3-14.4)0.000Hematokrit (%)40.3 (37.7-43.6)30.8 (29.3-3)40.0 (37.5-43.3)0.003MCV (f)86.7 (83.9-90.1)96.8 (68.8-105)66.7 (83.9-90.3)0.169RDW (f)13.6 (13.0-14.4)14.4 (13.8-15.1)13.6 (13.1-14.4)0.75Platelt (103µ/L)247.5 (207.5-313)210.5 (18.8-277.5)247.0 (20.7-313.0)0.460MPV (f)9.4 (86.10.3)9.6 (6.9 -0.10.1)9.5 (8.6-10.3)0.630.83PDW (%)ALT (U/L)16.2 (15.9-16.5) 1.0 (17.0-112.8)16.3 (16.1-66.66.0 (27.0-113.8)16.3 (5.0-42.0)0.633Albumi (g/d)38.5 (55.0-42.0)16.3 (16.1-66.66.0 (27.0-113.8)16.3 (5.0-42.0)0.633Albumi (g/d)38.5 (55.0-42.0)34.5 (28.6-37.2)34.1 (35.0-42.0)0.633Albumi (g/d)34.0 (22.0-104.2)9.7 (57.20-123.8)34.0 (21.05.8)0.704CFR (mg/nh)63.5 (11.0-150.2)12.9 (94.2.138.2)4.0 (11.0-148)0.635DN (mg/dL)0.8 (0.7-1.0)11.0 (8.14)0.8 (0.7-1.1)0.131Direkt Bilirubin (mg/dL)0.4 (0.3-0.9)0.4 (0.3-0.9)0.4 (0.3-0.9)0.433Direkt Bilirubin (mg/dL)0.7 (0.4 1.1)0.5 (0.4-0.6)0.7 (0.4 1.1)0.209De-Ritis Ratio1.2 (0.8-1.6)1.2 (0.8-1.6)0.3740.374Surgery6.0 (0.90.4)1.0 (2.0.9)0.403.0-00.403.0-0Direkt Bilirubin (mg/dL)1.2 (0.8-1.6)0.9040.504.0-0Surgery6.0 (0.90.4)<	RBC	4.6 (4.3-5.0)	3.2 (3.0-3.5)	4.6 (4.3-5.0)	0.003			
Henatokrit (%)40.3 (37.743.6)30.8 (29.33)40.0 (37.543.6)0.000MCV (f)86.7 (83.9 • 0.1)96.8 (86.8 • 10.5)86.7 (83.9 • 0.0.1 or 10.5)0.10 or 10.5RDW (f)13.6 (13.0 • 14.4)14.4 (13.8 • 15.1)13.6 (13.1 • 14.4)0.17 or 10.5Platelt (103µL)247.5 (207.5 • 31.3)210.5 (18.8 • 277.5)247.0 (207.3 • 13.0)0.400MPV (f)9.4 (8.6 • 10.3)9.6 (9.2 • 10.1)9.5 (8.6 • 10.3)0.670PDW (%)ALT (U/L)16.2 (15.9 • 16.5) 31.0 (17.0 • 12.0)16.3 (16.1 • 16.6) 60.0 (27.0 • 15.0)16.2 (15.9 • 16.5) 31.0 (17.0 • 10.6)Albumin (g/d)38.5 (35.0 • 42.0)34.5 (28.6 • 37.2)38.1 (35.0 • 42.0)0.670AST (U/L)34.0 (22.0 • 10.4)12.9 (94.2 • 13.8)64.0 (11.0 • 14.8)0.517BUN (mg/dL)32.1 (23.5 • 0.7)46.0 (42.3 • 48.2)32.1 (23.5 • 0.7)0.633Dreatin (mg/dL)0.8 (0.7 • 1.0)1.1 (0.8 • 1.4)0.8 (0.7 • 1.0)0.633Dreatin (mg/dL)0.4 (0.3 • 0.9)0.4 (0.3 • 0.9)0.4 (0.3 • 0.9)0.4 (0.3 • 0.9)Drekt Bilirubin (mg/dL)0.7 (0.4 • 1.1)0.5 (0.4 • 0.6)0.7 (0.4 • 1.1)0.2 (0.5 • 0.5)Drekt Bilirubin (mg/dL)0.7 (0.4 • 1.1)0.5 (0.4 • 0.6)0.7 (0.4 • 1.1)0.3 0.9LHOS Median (IQR)4.0 (3.0.6.0)1.1 (1.8 • 1.4)0.40 (3.0 • 0.9)0.4 (3.0 • 0.9)Drekt Bilirubin (mg/dL)0.7 (0.4 • 1.1)0.5 (0.4 • 0.3)0.5 (0.4 • 0.1)0.5 (0.4 • 0.1)Surger Mathematic Bilirubin (mg/dL)0.7 (0.4 • 1.1)0.5 (0.4 • 0.1	Hemoglobin (g/dl)	13.2 (12.3-14.4)	9.7 (9.0-10.9)	13.2 (12.3-14.4)	0.006			
MCV (f)86.7 (83.9-9.0.1)96.8 (86.8-10.5)86.7 (83.9-9.0.1)0.16RDW (f)13.6 (13.0-14.4)14.4 (13.8-15.1)13.6 (13.1-14.4)0.17 sPlatelt (103µ/L)247.5 (207.5 31.3)210.5 (18.8-27.5)247.0 (207.31.3.0)0.60 cMPV (f)9.4 (8.6-10.3)9.6 (9.2-10.1)9.5 (8.6-10.3)0.63 0.83 0.83Albumin (g/d)16.2 (15.9-16.5) 31.0 (17.0-112.8)16.3 (16.1-16.6) 66.0 (27.0-115.8)16.2 (15.9-16.5) 31.6 (17.0-112.8)0.63 0.83 0.83Albumin (g/d)38.5 (35.0-42.0)34.5 (28.6-37.2)38.1 (35.0-42.0)0.670AST (U/L)34.0 (22.0-104.2)97.5 (7.2-12.8)64.0 (11.0-14.8)0.81 0.71BV (mg/dl)32.1 (23.5-40.7)46.0 (42.3-48.2)32.1 (23.5-40.7)0.81 3.1BV (mg/dl)0.8 (0.7-1.0)1.1 (0.8-1.4)0.8 (0.7-1.0)0.81 3.1Total Bilirubin (mg/dl)0.4 (0.3-0.9)0.4 (0.3-0.9)0.4 (0.3-0.9)0.83 3.1Direkt Bilirubin (mg/dl)0.7 (0.4-1.1)0.5 (0.4-0.6)0.7 (0.4-1.1)0.80 7.1Direkt Bilirubin (mg/dl)0.7 (0.4-1.1)0.5 (0.4-0.6)0.7 (0.4-1.1)0.81 9.1Direkt Bilirubin (mg/dl)0.7 (0.4-1.1)0.5 (0.4-0.6)0.7 (0.4-1.1)0.81 9.1Direkt Bilirubin (mg/dl)0.7 (0.4-1.1)0.5 (0.4-0.6)0.7 (0.4-1.1)0.81 9.1Ungregot Bactering (mg/dl)0.4 (0.3-0.9)0.4 (0.3-0.9)0.5 (0.4-0.6)0.5 (0.4-0.6)Direkt Bilirubin (mg/dl)0.7 (0.4-1.1)0.5 (0.4-0.6)0.5 (0.4-0.6)0.5 (0.4-0.6)Surgeot Bacter	Hematokrit (%)	40.3 (37.7-43.6)	30.8 (29.3-33)	40.0 (37.5-43.3)	0.003			
RDW (fi)13.6 (13.0-14.4)14.4 (13.8-15.1)13.6 (13.1-14.4)0.175Platelet (103µ/L)247.5 (207.5 313)210.5 (181.8-277.5)247.0 (207.313.0)0.460MPV (fi)9.4 (8.6-10.3)9.6 (9.2-10.1)9.5 (8.6-10.3)0.673PDW (%)ALT (U/L)16.2 (15.9-16.5)31.0 (17.0-112.8)16.3 (16.1-16.6)6.6 (27.0-115.8)16.2 (15.9-16.5)31.5 (17.1-12.8)0.633 (13.0-42.0)Albumin (g/dl)38.5 (35.0-42.0)34.5 (28.6-37.2)38.1 (35.0-42.0)0.584AST (U/L)34.0 (22.0-104.2)97.5 (72.0-12.3.8)34.0 (22.105.8)0.517BUN (mg/dL)63.5 (11.0-150.2)12.9 (94.2-138.2)64.0 (11.0-148)0.517BUN (mg/dL)32.1 (23.5-40.7)46.0 (42.3-48.2)32.1 (23.5-40.7)0.833Creatinine (mg/dL)0.8 (0.7-1.0)0.110.810.613Direkt Bilirubin (mg/dL)0.4 (0.3-0.9)0.4 (0.3-0.9)0.433Direkt Bilirubin (mg/dL)0.7 (0.4-1.1)0.5 (0.4-0.6)0.70Direkt Bilirubin (mg/dL)0.7 (0.4-1.1)0.5 (0.4-0.6)0.71Direkt Bilirubin (mg/dL)0.7 (0.4-1.1)0.5 (0.4-0.6)0.514Direkt Bilirubin (mg/dL)0.4 (0.3-0.6)1.0 (2.5.0%)69.0 (3.0.7%)Direkt Bilirubin (mg/dL)40.3 (0.6-0.6)2.0 (2.0.3.2)4.0 (3.0-6.0)Direkt Bilirubin (mg/dL)0.4 (0.3-0.6.0)1.0 (2.5.0%)69.0 (3.0.7%)Direkt Bilirubin (mg/dL)68.0 (4.0.%)1.0 (2.5.0%)68.0 (4.9.%)Surgery68.0 (4.0.%)1.0 (2.5.0%)68.0 (4.9.%)Gra	MCV (fl)	86.7 (83.9-90.1)	96.8 (86.8-105)	86.7 (83.9-90.3)	0.169			
Platelt (13µ/L) 247.5 (207.5 r31) 210.5 (181.8-277.5) 247.0 (207.3 r3.0) 0.460 MPV (f) 9.4 (8.6 r0.3) 9.6 (9.2 r0.1) 9.5 (8.6 r0.3) 0.6 3 a 3 a 3 a 3 a 3 a 3 a 3 a 3 a 3 a 3	RDW (fl)	13.6 (13.0-14.4)	14.4 (13.8-15.1)	13.6 (13.1-14.4)	0.175			
MPV (f)9.4 (8.6-10.3)9.6 (9.2-10.1)9.5 (8.6-10.3)0.767PDW (shALT (U/L)16.2 (15.9-16.5) 31.0 (17.0-112.8)16.3 (16.1-16.6) 60.0 (27.0-113.8)16.2 (15.9-16.5) 31.0 (17.0-12.8)0.633 0.833Albumin (g/dl)38.5 (35.0-42.0)34.5 (28.6-37.2)38.1 (35.0-42.0)0.574AST (U/L)34.0 (22.0-104.2)97.5 (7.0-12.3.8)34.0 (22-105.8)0.574BUN (mg/dL)63.5 (11.0-150.2)12.9 (94.2-138.2)64.0 (11.0-148)0.517BUN (mg/dL)32.1 (23.5-40.7)46.0 (42.3-48.2)32.1 (23.5-40.7)0.833Creatinin (mg/dL)0.8 (0.7-1.0)1.1 (0.8-1.4)0.8 (0.7-1.1)0.633Direkt Bilirubin (mg/dL)0.4 (0.3-0.9)0.4 (0.3-0.9)0.4 (0.3-0.9)0.4 (0.3-0.9)Direkt Bilirubin (mg/dL)0.7 (0.4-1.1)0.5 (0.4-0.6)0.7 (0.4-1.1)0.289Direkt Bilirubin (mg/dL)0.7 (0.4-1.1)0.5 (0.4-0.6)0.7 (0.4-1.1)0.8 (0.7 (0.4-1.1)0.8 (0.7 (0.4-1.1)0.8 (0.7 (0.4-1.1)0.8 (0.7 (0.4-1.1)0.8 (0.7 (0.4-1.1)0.8 (0.8 (0.8 (0.8 (0.8 (0.6 (0.6 (0.6 (0.6 (0.6 (0.6 (0.6 (0.6	Platelet (103µ/L)	247.5 (207.5- 313)	210.5(181.8-277.5)	247.0(207-313.0)	0.460			
PDW (%)ALT (U/L) 16.2 (15.9-16.5)3.1.0 (17.0-112.8) 16.3 (16.1-16.6)6.0 (27.0-115.8) 16.2 (15.9-16.5)3.1.5 (17-112.8) 0.6330.833 Albumin (g/d) 38.5 (35.0-42.0) 34.5 (28.6-37.2) 38.1 (35.0-42.0) 0.070 AST (U/L) 34.0 (22.0-104.2) 97.5 (72.0-123.8) 34.0 (22.105.8) 0.584 CRP (mg/ml) 63.5 (11.0-150.2) 12.9 (94.2-138.2) 64.0 (11.0-148) 0.517 BUN (mg/dL) 32.1 (23.5-40.7) 46.0 (42.3-48.2) 32.1 (23.5-40.7) 0.085 Creatinine (mg/dL) 0.8 (0.7-1.0) 1.1 (0.8-1.4) 0.8 (0.7-1.1) 0.633 Direkt Bilirubin (mg/dL) 0.4 (0.3-0.9) 0.4 (0.3-0.9) 0.4 (0.3-0.9) 0.833 Indirekt Bilirubin (mg/dL) 0.7 (0.4-1.1) 0.5 (0.4-0.6) 0.7 (0.4-1.1) 0.289 De-Ritis Ratio 1.2 (0.8-1.6) 1.3 (1.1-1.8) 1.2 (0.8-1.6) 0.399 LHOS Median (IQR) 4.0 (3.0-6.0) 2.0 (2.0-3.2) 4.0 (3.0-6.0) 0.94 Surgery 68.0 (40.0%) 1.0 (25.0%) 69.0 (39.7%) 0.94 Grade 1 84.0 (49.4%) 2.0 (50.0%)	MPV (fl)	9.4 (8.6-10.3)	9.6 (9.2-10.1)	9.5 (8.6-10.3)	0.767			
Albumin (g/dl) 38.5 (35.0-42.0) 34.5 (28.6-37.2) 38.1 (35.0-42.0) 0.070 AST (IU/L) 34.0 (22.0-104.2) 97.5 (72.0-123.8) 34.0 (22-105.8) 0.584 CRP (mg/ml) 63.5 (11.0-150.2) 129 (94.2-138.2) 64.0 (11.0-148) 0.517 BUN (mg/dL) 32.1 (23.5-40.7) 46.0 (42.3-48.2) 32.1 (23.5-40.7) 0.085 Creatinine (mg/dL) 0.8 (0.7-1.0) 1.1 (0.8-1.4) 0.8 (0.7-1.1) 0.313 Total Bilirubin (mg/dL) 1.2 (0.7-2.0) 0.9 (0.8-1.4) 1.2 (0.7-2.0) 0.633 Direkt Bilirubin (mg/dL) 0.4 (0.3-0.9) 0.4 (0.3-0.9) 0.4 (0.3-0.9) 0.833 Indirekt Bilirubin (mg/dL) 0.7 (0.4-1.1) 0.5 (0.4-0.6) 0.7 (0.4-1.1) 0.289 De-Ritis Ratio 1.2 (0.8-1.6) 1.3 (1.1-1.8) 1.2 (0.8-1.6) 0.319 surgery 68.0 (40.0%) 2.0 (2.0-3.2) 4.0 (3.0-6.0) 0.544 Tokyo 2018 severity grade 70.7 (3.4-1.1) 0.987 0.987 Grade 1 84.0 (49.4%) 2.0 (50.0%) 86.0 (49.4%) 0.544 Grade 1 84.0 (49.4%) 2.0 (50.0%) 39.0 (22.4%) 0.987 </td <td>PDW (%)ALT (IU/L)</td> <td>16.2 (15.9-16.5)31.0 (17.0- 112.8)</td> <td>16.3 (16.1-16.6)66.0 (27.0-115.8)</td> <td>16.2 (15.9-16.5)31.5 (17-112.8)</td> <td>0.6330.833</td>	PDW (%)ALT (IU/L)	16.2 (15.9-16.5)31.0 (17.0- 112.8)	16.3 (16.1-16.6)66.0 (27.0-115.8)	16.2 (15.9-16.5)31.5 (17-112.8)	0.6330.833			
AST (IU/L) 34.0 (22.0-104.2) 97.5 (72.0-123.8) 34.0 (22-105.8) 0.584 CRP (mg/ml) 63.5 (11.0-150.2) 129 (94.2-138.2) 64.0 (11.0-148) 0.517 BUN (mg/dL) 32.1 (23.5-40.7) 46.0 (42.3-48.2) 32.1 (23.5-40.7) 0.085 Creatinine (mg/dL) 0.8 (0.7-1.0) 1.1 (0.8-1.4) 0.8 (0.7-1.1) 0.313 Total Bilirubin (mg/dL) 1.2 (0.7-2.0) 0.9 (0.8-1.4) 1.2 (0.7-2.0) 0.633 Direkt Bilirubin (mg/dL) 0.4 (0.3-0.9) 0.4 (0.3-0.9) 0.4 (0.3-0.9) 0.833 Indirekt Bilirubin (mg/dL) 0.7 (0.4-1.1) 0.5 (0.4-0.6) 0.7 (0.4-1.1) 0.289 De-Ritis Ratio 1.2 (0.8-1.6) 1.3 (1.1-1.8) 1.2 (0.8-1.6) 0.399 LHOS Median (IQR) 4.0 (3.0-6.0) 2.0 (2.0-3.2) 4.0 (3.0-6.0) 0.544 surgery 68.0 (40.0%) 1.0 (25.0%) 69.0 (39.7%) 0.544 Tokyo 2018 severity grade 70.0 (50.0%) 86.0 (49.4%) 0.0 (50.0%) 86.0 (49.4%) Grade 1 84.0 (24.2%) 1.0 (25.0%) 39.0 (22.4%) 10.0 (25.0%) 39.0 (22.4%)	Albumin (g/dl)	38.5 (35.0- 42.0)	34.5 (28.6-37.2)	38.1 (35.0-42.0)	0.070			
CRP (mg/ml) 63.5 (11.0-150.2) 129 (94.2-138.2) 64.0 (11.0-148) 0.517 BUN (mg/dL) 32.1 (23.5-40.7) 46.0 (42.3-48.2) 32.1 (23.5-40.7) 0.085 Creatinine (mg/dL) 0.8 (0.7-1.0) 1.1 (0.8-1.4) 0.8 (0.7-1.1) 0.313 Total Bilirubin (mg/dL) 1.2 (0.7-2.0) 0.9 (0.8-1.4) 1.2 (0.7-2.0) 0.633 Direkt Bilirubin (mg/dL) 0.4 (0.3-0.9) 0.4 (0.3-0.9) 0.4 (0.3-0.9) 0.833 Indirekt Bilirubin (mg/dL) 0.7 (0.4-1.1) 0.5 (0.4-0.6) 0.7 (0.4-1.1) 0.2899 De-Ritis Ratio 1.2 (0.8-1.6) 1.3 (1.1-1.8) 1.2 (0.8-1.6) 0.399 LHOS Median (IQR) 4.0 (3.0-6.0) 2.0 (2.0-3.2) 4.0 (3.0-6.0) 0.514 surgery 68.0 (40.0%) 1.0 (25.0%) 69.0 (39.7%) 0.544 Tokyo 2018 severity grade 9.0 (20.50.0%) 86.0 (49.4%) 9.0 (28.2%) Grade II 88.0 (24.4%) 2.0 (50.0%) 86.0 (49.4%) 9.0 (28.4%) Grade III 48.0 (28.2%) 1.0 (25.0%) 39.0 (22.4%) 9.0 (28.2%) <td>AST (IU/L)</td> <td>34.0 (22.0-104.2)</td> <td>97.5 (72.0-123.8)</td> <td>34.0 (22-105.8)</td> <td>0.584</td>	AST (IU/L)	34.0 (22.0-104.2)	97.5 (72.0-123.8)	34.0 (22-105.8)	0.584			
BUN (mg/dL) 32.1 (23.5-40.7) 46.0 (42.3 - 48.2) 32.1 (23.5-40.7) 0.085 Creatinine (mg/dL) 0.8 (0.7-1.0) 1.1 (0.8-1.4) 0.8 (0.7-1.1) 0.313 Total Bilirubin (mg/dL) 1.2 (0.7-2.0) 0.9 (0.8-1.4) 1.2 (0.7-2.0) 0.633 Direkt Bilirubin (mg/dL) 0.4 (0.3-0.9) 0.4 (0.3-0.9) 0.4 (0.3-0.9) 0.833 Indirekt Bilirubin (mg/dL) 0.7 (0.4-1.1) 0.5 (0.4-0.6) 0.7 (0.4-1.1) 0.289 De-Ritis Ratio 1.2 (0.8-1.6) 1.3 (1.1-1.8) 1.2 (0.8-1.6) 0.399 LHOS Median (IQR) 4.0 (3.0-6.0) 2.0 (2.0-3.2) 4.0 (3.0-6.0) 0.544 surgery 68.0 (40.0%) 1.0 (25.0%) 69.0 (39.7%) 0.544 Tokyo 2018 severity grade 84.0 (49.4%) 2.0 (50.0%) 86.0 (49.4%) 0.987 Grade 1 84.0 (28.2%) 1.0 (25.0%) 39.0 (22.4%) 1.0 (25.0%) 39.0 (22.4%) Grade III 48.0 (28.2%) 1.0 (25.0%) 49.0 (28.2%) 49.0 (28.2%) 49.0 (28.2%)	CRP (mg/ml)	63.5 (11.0-150.2)	129 (94.2-138.2)	64.0 (11.0-148)	0.517			
Creatinine (mg/dL) 0.8 (0.7-1.0) 1.1 (0.8-1.4) 0.8 (0.7-1.1) 0.313 Total Bilirubin (mg/dL) 1.2 (0.7-2.0) 0.9 (0.8-1.4) 1.2 (0.7-2.0) 0.633 Direkt Bilirubin (mg/dL) 0.4 (0.3-0.9) 0.4 (0.3-0.9) 0.4 (0.3-0.9) 0.833 Indirekt Bilirubin (mg/dL) 0.7 (0.4-1.1) 0.5 (0.4-0.6) 0.7 (0.4-1.1) 0.289 De-Ritis Ratio 1.2 (0.8-1.6) 1.3 (1.1-1.8) 1.2 (0.8-1.6) 0.399 LHOS Median (IQR) 4.0 (3.0-6.0) 2.0 (2.0-3.2) 4.0 (3.0-6.0) 0.118 surgery 68.0 (40.0%) 1.0 (25.0%) 69.0 (39.7%) 0.544 Tokyo 2018 severity grade 84.0 (49.4%) 2.0 (50.0%) 86.0 (49.4%) Grade 1 84.0 (22.4%) 1.0 (25.0%) 39.0 (22.4%) Grade III 48.0 (28.2%) 1.0 (25.0%) 49.0 (28.2%)	BUN (mg/dL)	32.1 (23.5-40.7)	46.0 (42.3-48.2)	32.1 (23.5-40.7)	0.085			
Total Bilirubin (mg/dL) 1.2 (0.7-2.0) 0.9 (0.8-1.4) 1.2 (0.7-2.0) 0.633 Direkt Bilirubin (mg/dL) 0.4 (0.3-0.9) 0.4 (0.3-0.9) 0.4 (0.3-0.9) 0.833 Indirekt Bilirubin (mg/dL) 0.7 (0.4-1.1) 0.5 (0.4-0.6) 0.7 (0.4-1.1) 0.289 De-Ritis Ratio 1.2 (0.8-1.6) 1.3 (1.1-1.8) 1.2 (0.8-1.6) 0.399 LHOS Median (IQR) 4.0 (3.0-6.0) 2.0 (2.0-3.2) 4.0 (3.0-6.0) 0.118 surgery 68.0 (40.0%) 1.0 (25.0%) 69.0 (39.7%) 0.544 Tokyo 2018 severity grade 9.80 (24.4%) 2.0 (50.0%) 86.0 (49.4%) 0.987 Grade 1 84.0 (49.4%) 2.0 (50.0%) 86.0 (49.4%) 9.0 (28.2%) 1.0 (25.0%) 9.0 (28.2%) Grade III 48.0 (28.2%) 1.0 (25.0%) 49.0 (28.2%) 1.0 (25.0%) 9.0 (28.2%) 1.0 (25.0%) 9.0 (28.2%)	Creatinine (mg/dL)	0.8 (0.7-1.0)	1.1 (0.8-1.4)	0.8 (0.7-1.1)	0.313			
Direkt Bilirubin (mg/dL) 0.4 (0.3-0.9) 0.4 (0.3-0.9) 0.833 Indirekt Bilirubin (mg/dL) 0.7 (0.4-1.1) 0.5 (0.4-0.6) 0.7 (0.4-1.1) 0.289 De-Ritis Ratio 1.2 (0.8-1.6) 1.3 (1.1-1.8) 1.2 (0.8-1.6) 0.399 LHOS Median (IQR) 4.0 (3.0-6.0) 2.0 (2.0-3.2) 4.0 (3.0-6.0) 0.118 surgery 68.0 (40.0%) 1.0 (25.0%) 69.0 (39.7%) 0.544 Tokyo 2018 severity grade 0.2 (50.0%) 86.0 (49.4%) 0.987 Grade 1 84.0 (49.4%) 2.0 (50.0%) 86.0 (49.4%) 1.0 (25.0%) 99.0 (22.4%) Grade III 48.0 (28.2%) 1.0 (25.0%) 49.0 (28.2%) 1.0 (25.0%) 99.0 (28.2%)	Total Bilirubin (mg/dL)	1.2 (0.7-2.0)	0.9 (0.8-1.4)	1.2 (0.7-2.0)	0.633			
Indirekt Bilirubin(mg/dL) 0.7 (0.4-1.1) 0.5 (0.4-0.6) 0.7 (0.4-1.1) 0.289 De-Ritis Ratio 1.2 (0.8-1.6) 1.3 (1.1-1.8) 1.2 (0.8-1.6) 0.399 LHOS Median (IQR) 4.0 (3.0-6.0) 2.0 (2.0-3.2) 4.0 (3.0-6.0) 0.118 surgery 68.0 (40.0%) 1.0 (25.0%) 69.0 (39.7%) 0.544 Tokyo 2018 severity grade 0.987 0.987 Grade 1 84.0 (49.4%) 2.0 (50.0%) 86.0 (49.4%) 0.987 Grade 1I 38.0 (22.4%) 1.0 (25.0%) 99.0 (28.2%) 1.0 (28.2%)	Direkt Bilirubin (mg/dL)	0.4 (0.3-0.9)	0.4 (0.3-0.9)	0.4 (0.3-0.9)	0.833			
De-Ritis Ratio 1.2 (0.8-1.6) 1.3 (1.1-1.8) 1.2 (0.8-1.6) 0.399 LHOS Median (IQR) 4.0 (3.0-6.0) 2.0 (2.0-3.2) 4.0 (3.0-6.0) 0.118 surgery 68.0 (40.0%) 1.0 (25.0%) 69.0 (39.7%) 0.544 Tokyo 2018 severity grade 2.0 (50.0%) 86.0 (49.4%) 0.987 Grade 1 84.0 (49.4%) 2.0 (50.0%) 86.0 (49.4%) 1.0 (25.0%) Grade III 48.0 (28.2%) 1.0 (25.0%) 49.0 (28.2%) 1.0 (25.0%)	Indirekt Bilirubin(mg/dL)	0.7 (0.4-1.1)	0.5 (0.4-0.6)	0.7 (0.4-1.1)	0.289			
LHOS Median (IQR) 4.0 (3.0-6.0) 2.0 (2.0-3.2) 4.0 (3.0-6.0) 0.118 surgery 68.0 (40.0%) 1.0 (25.0%) 69.0 (39.7%) 0.544 Tokyo 2018 severity grade 2.0 (50.0%) 86.0 (49.4%) 0.987 Grade 1 84.0 (49.4%) 2.0 (50.0%) 86.0 (49.4%) 1.0 (25.0%) Grade III 48.0 (28.2%) 1.0 (25.0%) 49.0 (28.2%) 1.0 (25.0%)	De-Ritis Ratio	1.2 (0.8-1.6)	1.3 (1.1-1.8)	1.2 (0.8-1.6)	0.399			
surgery 68.0 (40.0%) 1.0 (25.0%) 69.0 (39.7%) 0.544 Tokyo 2018 severity grade	LHOS Median (IQR)	4.0 (3.0-6.0)	2.0 (2.0-3.2)	4.0 (3.0-6.0)	0.118			
Tokyo 2018 severity grade 0.987 Grade 1 84.0 (49.4%) 2.0 (50.0%) 86.0 (49.4%) Grade II 38.0 (22.4%) 1.0 (25.0%) 39.0 (22.4%) Grade III 48.0 (28.2%) 1.0 (25.0%) 49.0 (28.2%)	surgery	68.0 (40.0%)	1.0 (25.0%)	69.0 (39.7%)	0.544			
Grade 1 84.0 (49.4%) 2.0 (50.0%) 86.0 (49.4%) Grade II 38.0 (22.4%) 1.0 (25.0%) 39.0 (22.4%) Grade III 48.0 (28.2%) 1.0 (25.0%) 49.0 (28.2%)	Tokyo 2018 severity grade				0.987			
Gradell 38.0 (22.4%) 1.0 (25.0%) 39.0 (22.4%) Grade III 48.0 (28.2%) 1.0 (25.0%) 49.0 (28.2%)	Grade 1	84.0 (49.4%)	2.0 (50.0%)	86.0 (49.4%)				
Grade III 48.0 (28.2%) 1.0 (25.0%) 49.0 (28.2%)	Gradell	38.0 (22.4%)	1.0 (25.0%)	39.0 (22.4%)				
	Grade III	48.0 (28.2%)	1.0 (25.0%)	49.0 (28.2%)				

(WBC, white blood cell; RBC, red blood cells; MCV, mean corpusculer volume; RDW, red cell distribution width; MPV: mean platelet volume; PDW, Platelet Distribution Width; ALT, alanine aminotransferase; AST, aspartate aminotransferase; CRP, C-reactive protein; BUN, blood urea nitrogen; LHOS, length of hospital stay/day)

Table.2 Relationship of demograhic parameters, laboratory parameters, De-Ritis ratio with operation status							
	Non-operated n=105(60.34%)	Operated (n=69)(39.66%)	Total(n=174)	p value			
Age median(IQR)	59.0 (43.0to74.0)	59.0 (44.0to71.0)	59.0 (43.2to71.8)	0.884			
Gender n(%)				0.068			
Female	59.0 (56.2%)	29.0 (42.0%)	88.0 (50.6%)				
Male	46.0 (43.8%)	40.0 (58.0%)	86.0 (49.4%)				
Comorbidities n(%)							
Hipertension	49.0 (46.7%)	30.0 (43.5%)	79.0 (45.4%)	0.679			
Diabetes Mellitus	17.0 (16.2%)	19.0 (27.5%)	36.0 (20.7%)	0.071			
Malignancy	2.0 (1.9%)	1.0 (1.4%)	3.0 (1.7%)	0.821			
Alzheimer	2.0 (1.9%)	1.0 (1.4%)	3.0 (1.7%)	0.821			
Chronic Obstructive Pulmonary Disease	5.0 (4.8%)	6.0 (8.7%)	11.0 (6.3%)	0.297			
Coronary artery disease	23.0 (21.9%)	12.0 (17.4%)	35.0 (20.1%)	0.468			
Asthma	6.0 (5.7%)	9.0 (13.0%)	15.0 (8.6%)	0.09			
Heart Failure	7.0 (6.7%)	2.0 (2.9%)	9.0 (5.2%)	0.272			
Chronic Renal Failure	2.0 (1.9%)	3.0 (4.3%)	5.0 (2.9%)	0.345			
Cerebrovascular Disease	6.0 (5.7%)	4.0 (5.8%)	10.0 (5.7%)	0.982			
Laboratuary parameters Median (IQR)							
WBC (103µ/L)	12.6 (10.3-16.1)	13.0 (10.6-16.2)	12.9 (10.3-16.2)	0.763			
Neutrophil (103µ/L)	10.4 (8.2-13.8)	10.5 (7.9-13.4)	10.5 (8.0-13.6)	0.797			
Monocyte (103µ/L)	0.7 (0.5-0.9)	0.7 (0.4-0.9)	0.7 (0.5-0.9)	0.510			
Lymphocyte (103µ/L)	1.5 (1.0-2.2)	1.7 (1.0-2.2)	1.6 (1.0-2.2)	0.404			
Eosinophil	0.1 (0.0-0.1)	0.0 (0.0-0.1)	0.1 (0.0-0.1)	0.456			
Basophil	0.0 (0.0-0.0)	0.0 (0.0-0.0)	0.0 (0.0-0.0)	0.072			
RBC	4.6 (4.2-5.1)	4.6 (4.3-4.9)	4.6 (4.3-5.0)	0.296			
Hemoglobin (g/dl)	13.4 (12.4-14.5)	13.0 (12.0-14.1)	13.2 (12.3-14.4)	0.184			
Hematokrit (%)	40.3 (37.8-43.8)	39.1 (36.9-42.8)	40.0 (37.5-43.3)	0.288			
MCV (fl)	86.6 (84.0-90.0)	86.7 (83.6-90.9)	86.7 (83.9-90.3)	0.862			
RDW (fl)	13.8 (13.2-14.5)	13.5 (12.9-14.2)	13.6 (13.1-14.4)	0.122			
Platelet (103µ/L)	241.0 (196.0-302)	257.0 (225.0-339)	247.0 (207.0-313)	0.042			
MPV (fl)	9.5 (8.8-10.3)	9.3 (8.5-10.4)	9.5 (8.6-10.3)	0.969			
PDW (%)	16.3 (16.0-16.6)	16.1 (15.8-16.4)	16.2 (15.9-16.5)	0.018			
ALT (IU/L)	36.0 (18.0-127.0)	27.0 (16.0-62.0)	31.5 (17.0-112.8)	0.095			
Albumin (g/dl)	38.0 (34.0-42.0)	38.6 (35.0-43.0)	38.1 (35.0-42.0)	0.535			
AST (IU/L)	42.0 (23.0-162.0)	31.0 (22.0-49.0)	34.0 (22.0-105.8)	0.069			
CRP (mg/ml)	61.0 (10.0-143.0)	74.0 (16.0-157.0)	64.0 (11.0-148.0)	0.353			
BUN (mg/dL)	34.2 (23.5-42.8)	32.1 (23.5-38.5)	32.1 (23.5-40.7)	0.808			
Creatinine (mg/dL)	0.9 (0.7-1.1)	0.8 (0.7-1.0)	0.8 (0.7-1.1)	0.126			
Total Bilirubin (mg/dL)	1.3 (0.8-2.2)	1.0 (0.6-1.7)	1.2 (0.7-2.0)	0.051			
Direkt Bilirubin (mg/dL)	0.5 (0.3-1.2)	0.4 (0.2-0.7)	0.4 (0.3-0.9)	0.049			
Indirekt Bilirubin (mg/dl)	0.7 (0.5to1.1)	0.6 (0.4to0.9)	0.7 (0.4-1.1)	0.143			
De-Ritis Ratio	1.2 (0.8to1.6)	1.2 (0.8to1.8)	1.2 (0.8-1.6)	0.890			
LHOS Median (IQR)	4.0 (3.0to7.0)	4.0 (3.0to6.0)	4.0 (3.0-6.0)	0.369			
Mortality	3.0 (2.9%)	1.0 (1.4%)	4.0 (2.3%)	0.544			

(WBC, white blood cell; RBC, red blood cells; MCV, mean corpusculer volüme; RDW, red cell distribution width; MPV: mean platelet volüme; PDW, Platelet Distribution Width; ALT, alanine aminotransferase; AST, aspartate aminotransferase, CRP, C-reactive protein; BUN, blood urea nitrogen; LHOS, length of hospital stay/day)

Table. 3 Relationship between laboratory parameters and De-Ritis rate and mortality in operated patients								
	Survivor n=68	Non-survivor n=1	Total (n=69)	p value				
Age	59.0 (43.8-71.0)	59.0 (59.0-59.0)	59.0 (44.0-71.0)	0.980				
Laboratuary parameters Median (IQR)								
WBC (103µ/L)	12.9 (10.6-15.7)	16.8 (16.8-16.8)	13.0 (10.6-16.2)	0.340				
Neutrophil (103µ/L)	10.5 (7.9-13.3)	14.8 (14.8-14.8)	10.5 (7.9-13.4)	0.292				
Monocyte (103µ/L)	0.7 (0.4-0.9)	0.8 (0.8-0.8)	0.7 (0.4-0.9)	0.725				
Lymphocyte (103µ/L)	1.7 (1.0-2.2)	1.2 (1.2-1.2)	1.7 (1.0-2.2)	0.514				
Eosinophil	0.0 (0.0-0.1)	0.0 (0.0-0.0)	0.0 (0.0-0.1)	0.762				
Basophil	0.0 (0.0-0.0)	0.0 (0.0-0.0)	0.0 (0.0-0.0)	0.778				
RBC	4.6 (4.3-4.9)	3.1 (3.1-3.1)	4.6 (4.3-4.9)	0.088				
Hemoglobin (g/dl)	13.0 (12.0-14.1)	8.9 (8.9-8.9)	13.0 (12.0-14.1)	0.097				
Hematokrit (%)	39.4 (36.9-42.8)	28.1 (28.1-28.1)	39.1 (36.9-42.8)	0.097				
MCV (fl)	86.7 (83.6-90.9)	90.7 (90.7-90.7)	86.7 (83.6-90.9)	0.422				
RDW (fl)	13.5 (12.9-14.2)	13.6 (13.6-13.6)	13.5 (12.9-14.2)	0.841				
Platelet (103µ/L)	256 (223.8-336.0)	438 (438-438)	257.0 (225-339)	0.132				
MPV (fl)	9.4 (8.5-10.4)	8.1 (8.1-8.1)	9.3 (8.5-10.4)	0.191				
Pct	0.2 (0.2-0.3)	0.3 (0.3-0.3)	0.2 (0.2-0.3)	0.238				
PDW (%)	16.1 (15.8-16.4)	15.9 (15.9-15.9)	16.1 (15.8-16.4)	0.513				
ALT(IU/L)	26.5 (16.0-56.8)	98.0 (98.0-98.0)	27.0 (16.0-62.0)	0.315				
Albumin (g/dl)	39.0 (35.6-43.0)	32.0 (32.0-32.0)	38.6 (35.0-43.0)	0.183				
AST(IU/L)	30.5 (21.5-48.2)	102.0 (102.0-102.0)	31.0 (22.0-49.0)	0.248				
CRP (mg/ml)	71.5 (15.0-158.2)	135.0 (135.0-135.0)	74.0 (16.0-157.0)	0.451				
BUN (mg/dL)	31.0 (23.5-39.1)	34.2 (34.2-34.2)	32.1 (23.5-38.5)	0.782				
Creatinine (mg/dL)	0.8 (0.7-1.0)	0.7 (0.7-0.7)	0.8 (0.7-1.0)	0.422				
Total Bilirubin (mg/dL)	1.0 (0.6-1.7)	1.0 (1.0-1.0)	1.0 (0.6-1.7)	0.880				
Direkt Bilirubin (mg/dL)	0.4 (0.2-0.7)	0.5 (0.5-0.5)	0.4 (0.2-0.7)	0.514				
Indirekt Bilirubin	0.6 (0.4-0.9)	0.4 (0.4-0.4)	0.6 (0.4-0.9)	0.547				
De-Ritis Ratio	1.2 (0.8-1.8)	1.0 (1.0-1.0)	1.2 (0.8-1.8)	0.688				
LHOS Median (IQR)	4.0 (3.0-6.0)	2.0 (2.0-2.0)	4.0 (3.0-6.0)	0.139				
(WBC white blood cell: BRC red blood cells: MCV mean corpuscular volume: BDW red cell distribution width: MPV: mean platelet volume: PDW Platelet Distribution Width: ALT alarine aminotransferase: AST								

(WBC, white blood cell; RBC, red blood cells; MCV, mean corpusculer volüme; RDW, red cell distribution width; MPV: mean platelet volüme; PDW, Platelet Distribution Width; ALT, alanine aminotransferase; AST, aspartate aminotransferase, CRP, C-reactive protein; BUN, blood urea nitrogen; LHOS, length of hospital stay/day)

Ritis ratio and mortality.^[16]

It's shown that the rate of De-Ritis was more frequently investigated in patients with cancer in the literature. The rate of De-Ritis, which can be obtained quickly and easily, has also been investigated in patients with many different malignancies.^[17-19] In a study examining the relationship between colorectal and lung cancers and mortality, the De-Ritis ratio was found to have a significant relationship with both cancer incidence and mortality in cancer patients.^[17] In a meta-analysis, the De-Ritis ratio was found to be effective in determining the prognosis of liver cancers, renal cell cancers, and gallbladder cancers.^[18] In a retrospective study conducted on patients with hepatocellular cancer and including 1147 patients, it was observed that the preoperative De-Ritis ratio could predict the postoperative prognosis in patients with hepatitis B and hepatitis C-related cancer.^[19] In a study conducted by Ghahari et al. on 89 patients with urethral bladder cancer who underwent radical cystectomy, they found that the average De-Ritis ratio was effective in the survey, and a high De-Ritis ratio was associated with mortality. ^[20] In another study, a similarly low De-Ritis ratio was found to be significant in disease-specific survival and overall survival. ^[21] The effect of the De-Ritis ratio on the prognosis before the operation was evaluated in patients who underwent surgery for prostate cancer, and it was determined that, contrary to our study, the De-Ritis ratio could be used as a risk factor. ^[22] Jadhav et al., on the other hand, found that the De-Ritis ratio could predict prognosis in patients diagnosed with prostate cancer.^[23] In patients with testicular tumors who underwent orchiectomy, it was found that the rate of De-Ritis was not statistically significantly higher than in patients who underwent varicocelectomy.^[24] Our study found that the De-Ritis ratio in operated patients was statistically insignificant in determining the prognosis.

In addition to studies on malignancy, clinical conditions with ischemic origin were also included in the studies. In a study conducted on patients brought to the hospital with cardiac arrest, 57% of the patients died during hospital follow-up. The high De-Ritis ratio was statistically significantly correlated with hospital mortality and intensive care mortality.^[26] A study including 3000 patients diagnosed with acute myocardial infarction found a statistically significant correlation between a high De-Ritis ratio in cardiac mortality and three-year mortality. However, in the same study, it was also found that the De-Ritis ratio was moderately sensitive in terms of determining mortality in the postangio period and was not

superior to other risk prediction models in terms of mortality. ^[27] In a study conducted on patients who developed acute kidney injury associated with elective percutaneous coronary intervention, AST and ALT values were found to be higher than those in patients who did not develop acute kidney injury after angiography. The de-Ritis ratio was statistically significantly higher in patients with acute kidney injury.^[28]

The De-Ritis ratio, which is discussed as to whether it is an indicator of liver injury or not, was also investigated in patients with thoracoabdominal trauma, regardless of liver injury. In a study conducted by Su et al. with 2248 thoracoabdominal trauma patients, mortality was found to be statistically significantly higher in the group with a De-Ritis ratio higher than >1.64; there was no statistically significant difference in mortality between those with a De-Ritis ratio <1.20 and those with a De-Ritis ratio between 1.20-1.64.^[29] In a study investigating the rate of De-Ritis in 351 patients with extensive burns, a statistically significant relationship was found between AST, ALT, De-Ritis ratios, and mortality, and it was found that the De-Ritis ratio was superior to albumin in determining prognosis.^[30] In a study conducted on patients with upper gastrointestinal bleeding treated in the intensive care unit, there was a statistically significant relationship between low albumin and mortality, and similar to our study, the De-Ritis ratio was not found to be statistically significant with mortality.^[31]

Limitations

There are many limitations in our study. Data from our patients were collected retrospectively. Cholecystitis with and without gallstones was not differentiated, and all acute cholecystitis cases were included in the study. Therefore, classification according to etiology was not made. The study did not include those who applied to the emergency department with a clinical condition other than cholecystitis. Therefore, the number of patients was limited. Since death due to cholecystitis is rare, our mortality rate was also low. The first admission laboratory examinations of the patients were included in the study. Follow-up laboratory values during hospitalization were not taken.

CONCLUSION

De-Ritis rate was not found to be associated with mortality in patients with acute cholecystitis. De-Ritis rate was not associated with mortality in emergency operated patients who underwent emergency surgery for acute cholecystitis.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was conducted with the permission of the University of Health Sciences, Ümraniye Education and Research Hospital Ethics Committee (Date: 20/10/2022, Decision No: B.10.1.TKH.4.34.H.GP.0.01/322).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was

obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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