Patients Evaluated before and after Surgery during the COVID-19 Outbreak: A Study from a Pandemic Hospital
Pandemi Hastanesinden Bir Çalışma: COVID-19 Pandemisi Sırasında Operasyon Öncesi ve Sonrası Değerlendirilen Hastalar

Abstract

Background: This study aims to evaluate patients who tested positive for COVID-19 (Coronavirus Disease 2019) in the preoperative period while they were scheduled for surgery in a pandemic hospital and patients who were diagnosed with COVID-19 in the postoperative period as well.

Materials and Method: A retrospective analysis was made on 420 patients who were planned to undergo surgery on March 11, 2020 (the beginning of the pandemic in our country) with a compulsory COVID-19 test in the preoperative evaluation. Among the patients examined, about 26 of them were found positive by the COVID PCR (polymerase chain reaction) test preoperative evaluation. 18 patients had a positive COVID PCR test after the operation. The recorded data included patient demographics, pre-op and post-op symptoms, laboratory and radiological findings, and a history of exposure to COVID-19.

Results: We detected the additional disease in 88.6% of 44 evaluated patients, 25 men and 19 women. Symptoms were present in 50% of the patients. The most common symptoms were fever and cough. When postoperative and preoperative patients were compared, only fever symptoms were found to be statistically higher in patients with postoperative PCR positive. In terms of laboratory findings, lymphocyte level was statistically low and CRP (c- reactive protein) level was higher in postoperative patients.

Conclusion: In the pre-op evaluation, there is no test or finding that ensures that the patient has not contracted COVID-19 for certain. It required a multidisciplinary assessment to minimize false-negative results. In the postoperative period, patients with positive COVID PCR test may have in-hospital contamination or transmission from patients' relatives. Unnecessary hospital visits should be limited as much as possible.

Keywords: SARS-CoV-2, preoperative, postoperative, symptoms

Özet

Amaç: Bu çalışmada bir pandemic hastanesinde preoperatif dönemde COVID-19 (Koronavirüs hastalığı 2019) pozitif çıkan ve ameliyat planlanan ve postoperatif dönemde COVID-19 tanısı alan hastaların değerlendirilmesi amaçlanmıştır. .

Gereç ve Yöntem: 11 Mart 2020'de (ülkemizde pandeminin başlangıcı) ameliyat edilmesi planlanan ve ameliyat öncesi değerlendirmede COVID-19 testi isteyen dört yüz yirmi hasta retrospektif olarak incelendi. İncelenen hastalardan yaklaşık 26'sı COVID PCR (polimeraz zincir reaksiyonu) testi ameliyat öncesi değerlendirmesinde pozitif bulundu. 18 hastada ameliyattan sonra pozitif COVID PCR testi yapıldı. Kaydedilen veriler hasta demografiklerini, ameliyat öncesi, ameliyat sonrası semptomları, laboratuvar ve radyolojik bulguları ve COVID-19'a maruz kalma öyküsünü içeriyordu.

Bulgular: Değerlendirilen 44 hastanın 25'i erkek ve 19'u kadındı. %88.6 sında ek hastalık tespit edildi. Hastaların% 50'sinde semptomlar mevcuttu. En yaygın semptomlar ateş ve öksürüktü. Postoperatif ve preoperatif hastalar karşılaştırıldığında, postoperatif PCR pozitif olan hastalarda sadece ateş semptomları istatistiksel olarak daha yüksek bulundu. Laboratuvar bulguları açısından ameliyat sonrası hastalarda lenfosit düzeyi istatistiksel olarak düşük ve CRP (c-reaktif protein) düzeyi daha yüksekti.

Sonuç: Preoperatif değerlendirmede, hastanın COVID-19 açısından negatif olduğuna dair herhangi bir test veya bulgu yoktur. Yanlış negatif sonuçları en aza indirmek için multidisipliner bir değerlendirme gereklidir. Postoperatif dönemde COVID PCR testi pozitif olan hastalarda hastane içi kontaminasyon veya hasta yakınlarından bulaş olabilir. Gereksiz hastane ziyaretleri mümkün olduğunca sınırlandırılmalıdır.

Anahtar Kelimeler: Sars-Cov-2, Ameliyat öncesi, Ameliyat sonrası, belirtiler

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INTRODUCTION

The Coronavirus disease 2019 (COVID-19) emerged in Wuhan, China in December 2019 and has become a global health problem [1]. This viral infection mainly affects the pulmonary system, and due to the highly contagious nature of the disease, concerns are raised regarding anesthesiology procedures during the pandemic [2-4]. Since asymptomatic patients may spread the virus, even during the incubation period [5], perioperative evaluation of all cases is vital for both patients and healthcare professionals.

Patients who underwent surgeries during the incubation period could progress to respiratory failure or multi-organ dysfunction postoperatively, experiencing a higher morbidity and mortality rate [6,7]. It had been shown that the incubation period for COVID-19 could persist for 14 days after exposure, leading to the possibility of presymptomatic transmission [5,8,9]. Testing all asymptomatic surgical patients allowed physicians to make a clinical judgment on the timing of procedures. Testing also identified COVID-19 patients who would require specific facility setup and perioperative airway management to prevent transmission, thus minimizing exposure to health care providers [10].

Symptom screening is another important aspect of risk stratification because there are no specific symptoms to distinguish COVID-19 from other respiratory infections [1]. According to the Centers for Disease Control and Prevention (CDC) and many other medical societies, screening should include an assessment of the following symptoms within the past 14 days: fever, headache, chills, recent loss of taste or smell, cough, and sore throat [11,12]. As patients might test negative during the asymptomatic incubation period, history regarding exposure to someone diagnosed with COVID-19 in the past 14 days also must be noted. Patients who were identified via symptoms and exposure screening must be monitored appropriately for patient safety, contact tracing, and spread prevention.

After all, the fact that the PCR test performed for preoperative evaluation is negative does not mean that patients are not infected. Questioning of symptoms, and whether there is a history of exposure, are more important. In addition, thoracic CTs (computed tomography), which is one of the COVID-19 imaging methods, helps us in some patients, but its place in preoperative evaluation is not fully known yet.

In this study, we aim to examine the characteristics of patients, laboratory findings and radiological findings and the status of PCR tests in the preoperative evaluation of patients undergoing an operation in a pandemic hospital in terms of COVID-19; and the evaluation of patients after operatıon in order to present our recommendations in terms of examinations required to minimize contamination in this process.

MATERIALS AND METHOD

A retrospective analysis was made on 420 patients who were planned to undergo surgery on March 11, 2020 (the beginning of the pandemic in our country) with a compulsory COVID-19 test in the preoperative evaluation. Among the patients examined, about 26 of them were found positive by the COVID PCR test preoperative evaluation. In addition, a further 18 patients had positive COVID PCR test results following surgery. The data is shown in the flowchart in Figure 1.

The recorded data included patient demographics, preoperative and postoperative symptoms, and the history of exposure to COVID-19. Also, the type of intervention, the emergency status of the intervention together with whether there is any alteration in the type of intervention related to COVID-19 was questioned. The type of tests during preoperative anesthesiology assessment, together with their results, was recorded. Laboratory and radiological findings of the patients were also recorded. The operations of patients with preoperative Covid PCR positivity were postponed.

Statistical Analysis

The normal distribution of numerical variables was tested by the Kolmogorov-Smirnov Test. Categorical variables are defined as frequency and percentage, and continuous variables with normal distribution are presented with mean and standard deviations. Numerical variables without normal distribution are presented by median and interquartile ranges. The Chi-square test (or Fisher's exact test) was used to describe the relationship between two categorical variables. Two independent methods were compared with the Student's t-test, two independent medians were compared with the Mann Whitney U Test, and two dependent medians were compared with the Wilcoxon Test. A p-value of less than 0.05 was chosen to show a statistically significant difference between the parameters examined.

RESULTS

Preoperatively, 420 patients were screened retrospectively. The preoperative PCR test of 26 patients was positive. Postoperatively, the PCR test of 18 patients was positive. The general characteristics of the patient with a PCR positive pre and postoperatively are shown in Table 1. Additional diseases were detected in 88.6% of 44 patients, 25 men and 19 women.

Symptoms were present in 50% of the patients. The most common symptoms were fever and cough. While an infiltrative lesion was observed in 11.4% of patients on PA (posteroanterior) chest radiography, lesions were observed in 27.3% of patients in thorax computed-tomography. Thorax CT was not performed in 40.9% of 44 patients. Most of the lesions were bilateral, peripheral, and ground glass density (Table 2).

The median days for patients with positive postoperative PCR test were 4 (min-max: 2-7) days.

When the postoperative and preoperative patients were compared, we found only fever symptoms to be statistically higher in those who were postoperative PCR positive (Table 3). In the comparison of preoperative and postoperative PCR positive patients, no difference was found between additional diseases and radiological involvement (Table 3).

In terms of laboratory findings, lymphocyte level was statistically lower and CRP level was higher in postoperative patients (Table 4).

DISCUSSION

As COVID-19 became contagious and had a mortal course, the functioning of the entire health system changed. Elective surgeries, in particular, have been postponed. However, emergency operations continued to be carried out in our hospital by taking necessary precautions. While the cases with an elective surgery plan were postponed in most of the centers (as in our hospital), emergency cases together with oncological surgeries are advised to be performed with precautions [13].

When the significant postoperative morbidity and mortality rates associated with surgery in COVID -19 patients were considered, all patients scheduled for surgery with suspected SARS-CoV-2 infection must undergo screening before their surgery. Patients who test positive in preoperative RT-PCR (real-time polymerase chain reaction) must be managed on a case basis by the clinical team treating them. Surgical decision-making must include the emergency condition of the patient, the supply of local hospital resources, and possible postoperative outcomes in case the operation is delayed for re-test purposes or to eliminate any symptoms. If the surgery is not urgent, and if the PCR test is positive in the preoperative period, it is appropriate to postpone the surgery, and plan to do it in elective conditions. The patient must be questioned in preoperative evaluations for COVID-19 symptoms and a potential history of SARS-CoV-2 exposure.

Because of the high level of SARS-CoV-2 shedding in the upper respiratory tract, which is estimated to begin two to three days prior to the onset of symptoms [9,14], asymptomatic or presymptomatic persons with COVID-19 can transmit the virus to others during this period [15] and at other times during the disease course [16]. It has been estimated that up to 17.9% of COVID-19 cases could be asymptomatic [17] and that approximately 44% of secondary cases in a cohort could have been infected during the presymptomatic stage of index cases. Symptoms were observed in 50% of our patients in our study. While 45.4% of preoperative patients had symptoms, 54.5% of postoperative patients had symptoms. More than half of the patients were asymptomatic.

In postoperative patients, symptoms also occurred between 2-7 days, and the most common symptom was fever. The emergence of symptoms in such a short time, especially between 2-3 days, does not suggest that the PCR negativity taken in the preoperative period in some of these patients is a false negative result. In addition, postoperative fever can sometimes be because of infection at the wound site or intra-abdominal abscess, especially in intra-abdominal surgery. Therefore, it would be wrong to directly attribute the fever to COVID-19 in these patients. It should also be considered that it can be multifactorial. Thus, the treatment management of these patients becomes a little more difficult.

In addition, our study found that postoperative PCR in 3 patients was attributed to positive companion patients. Since hygiene and social distance are important to prevent contamination of the disease, it is also necessary to follow these rules in the postoperative period. In-hospital transmission may also occur from asymptomatic hospital personnel, however, it is not possible to prevent this.

Hospital visits must be restricted to non-Covid wards as much as possible. Besides in-hospital visit restrictions, attention must also be paid regarding visit restrictions after discharge for a certain period. In fact, a postoperative isolation period can be identified in selected patient groups with fever but without COVID PCR or COVID-19 in imaging methods.

As it is seen, evaluating patient symptoms is inadequate as the only method to diagnose Covid-19. Although the pandemic was characterized as a respiratory disease in the early stages, gastrointestinal, cardiovascular, hematological, immunological and neurological symptoms of COVID-19 were also reported later [18-21].

Among these, only gastrointestinal symptoms were detected in the absence of respiratory symptoms. For this reason, although there are no specific guiding parameters in the laboratory tests during the preoperative period, besides questioning symptoms, there is an inflammatory response in these patients. Potentially, COVID-19-related immunological dysfunction can cause impairments in hematologic, hepatic, and renal laboratory markers. In our study, there were reduced lymphocyte values and increased CRP and D-dimer values in the laboratory parameters of some patients. However, these parameters are not specific to the disease, but the CRP and D-dimer values may be detected to be high in some patients with underlying diseases, especially cancer. Although useful in measuring the severity of the disease, no individual laboratory marker provides a special benefit for the diagnosis of active SARS-CoV-2 infection in a multisystem study. For this reason, non-diagnostic laboratory studies have little benefit in preoperative screening for COVID-19.

The two prominent tests performed to screen the COVID-19 virus during preoperative evaluation are PCR, from a nasopharyngeal swab, and a chest CT scan [22,23]. Chest CT was commonly applied in preoperative evaluation during the pandemic because it can show relevant aim and indicative changes in the affected lungs, even in the PCR false-negative patients.

In our study, a nasopharyngeal swab sample was taken once for preoperative evaluation. A thorax CT was obtained in 17 of the patients who were found to be RT-PCR positive during preoperative evaluation. While lesions were detected on CT in 50%, Thorax CT was normal in 78.6%. However, taking the reported respective sensitivity and specificity of the Chest CT as 94% and 37% into account, some long-term detrimental consequences of radiation exposure causes its application with caution as well [24].

According to the literature, ground-glass opacities, consolidation, pleural thickening, interlobular septal thickening and air bronchogram are the most common chest CT findings associated with COVID-19. These lesions are more likely to be seen in the lower lobes. However, there are differences in reported CT characteristics with time throughout COVID-19 disease [25]. Chest CTs may have a greater sensitivity than RT-PCRs for detecting respiratory involvement of the SARS-CoV-2 infection, but multiple meta-analyses in the literature estimate the modality to be below 40% for COVID-19 [26]. Therefore, while it is not recommended to use only a Chest CT to screen for SARS-CoV-2 infection [27], it may be useful to characterize pulmonary involvement in patients with COVID-19 confirmed by RT-PCR tests.

There is limited data on the examination and treatment of the SARS-CoV-2 infection, but when we start from patients with COVID-19 PCR positivity in the early period of preoperative and postoperative, detailed anamnesis and advanced imaging methods in preoperative patients may be helpful. For patients with typical symptoms, ground-glass opacities may not be detected in a chest radiograph. When clinical suspicion is high, a Thorax CT can be planned for patients, considering the urgency of operation and treatment. However, routine Thorax CTs should only be requested in the selected patient group, because of the cost to the health sector and the exposure of the patient to radiation. It should be kept in mind that it can be negative in the early stages. suspected patients. Especially in patients with postoperative early-stage COVID PCR

positivity, it raises the question of whether the patient can be diagnosed with COVID if the second COVID PCR sample was taken in the preoperative period.

In conclusion, no tests or findings indicate that a patient does not definitely have COVID-19 in preoperative evaluations. For this reason, we need a multidisciplinary evaluation to minimize false-negative results. In-hospital transmission or transmission from relatives may occur in patients who test positive in a COVID PCR during the postoperative period. Therefore, unnecessary hospital visits must be limited as much as possible. Patients and their relatives should be informed about typical COVID-19 symptoms in patients discharged earlier in the postoperative period. It must be kept in mind that even if fever is not specific, it may occur because of COVID-19 infection in hospitalized patients.

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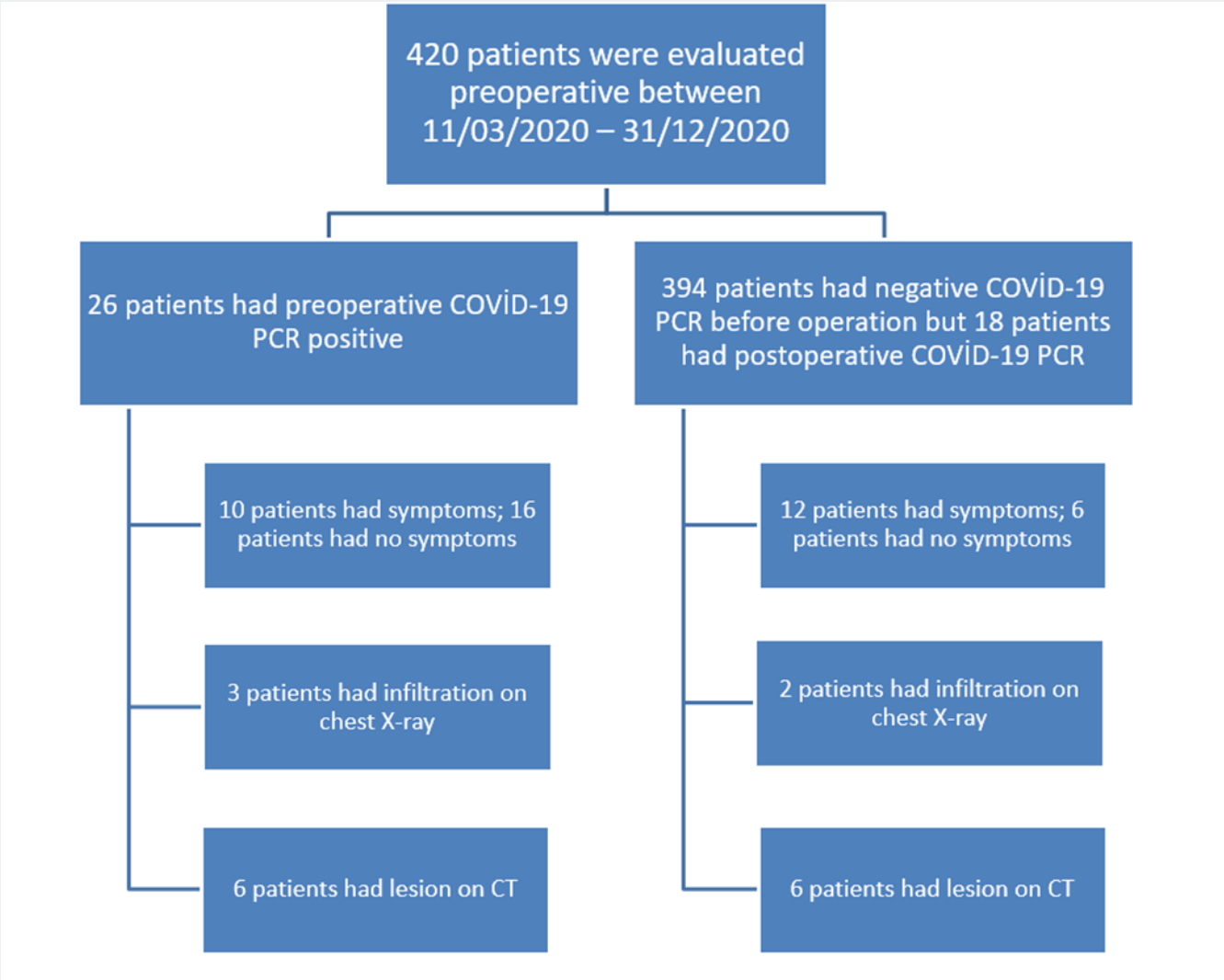

Figure 1. Follow chart of patients

Table 1. Characteristics of the patients included in the work

	N	%
Gender		
Male	25	56.8
Female	19	43.2
Additional disease		
Present	39	88.6
Absent	5	11,4
Diabetes mellitus		
Present	18	40.9
Absent	26	59,1
Hypertension		
Present	19	43.2
Absent	25	56,8
Chronic renal failure		
Present	1	2.3
Absent	43	97.7
Coronary artery disease		
PRESENT	7	15.9
ABSENT	37	84.1
Chronic obstructive pulmonary disease		
Present	5	11.4
Absent	39	88.6
Cancer		
Present	15	34.1
Absent	29	65.9
Blood group		
A	21	51.2
B	5	12.2
0	15	36.6
Smoker	5	11.4
Quitted	15	34.1
Nonsmoker	24	54.5
Symptom		
Present	22	50
Absent	22	50
Fever	11	25
Cough	11	25
Dyspnea	9	20.5
Surgical Departments		
Orthopedics and Traumatology	17	38.6
Cardiovascular Surgeon	2	4.5
Gastroenterology	3	6.8
Neurosurgery	5	11.4
Gynecology and Obstetrics	2	4.5
General Surgery	15	34.1

Table 2. Radiological findings and treatments of patients in the work

	N	%
Infiltration in chest radiograph		
Present	5	12.5
Absent	35	87.5
Infiltration in Thorax CT		
Present	12	46.2
Absent	14	53.8
Bilateral	10	83.3
Unilateral	2	16.7
Diffuse	1	8.3
Peripheral	11	91.7
Ground glass opacity	12	100
Treatment		
Inpatient	39	88.6
Outpatient	5	11.4
Treatment		
Chloroquıne	1	2.3
Favipiravir	41	93.2
Chloroquine and favipiravir	1	2.3
No treatment	1	2.3
Steroid		
Took	6	13.6
Did not take	38	86.4
Extended treatment	6	13.6
Antibiotic	7	15.9
Discharge	38	86.4
Intensive care transport	4	9.1
Exitus	2	4.5

Table 3. Differences between symptoms and radiological findings in preoperative and postoperative patients

	PREOPERATIVE	POSTOPERATIVE	P VALUE
Gender Male Female	 15(60%) 11(57.9%)	 10(40%) 8(42.1%)	 1.000
Additional disease Present Absent	 23(59%) 3(60%)	 16(41%) 2(40%)	 1.000
Symptoms Present Absent	 10(45.5%) 16(72.7%)	 12(54.5%) 6(27.3%)	 0.125
Fever Present Absent	 1(9.1%) 25(75.8%)	 10(90.9%) 8(24.2%)	 0.000
Cough Present Absent	 5(45.5%) 21(63.6%)	 6(54.5%) 12(36.4%)	 0.314
Dyspnea Present Absent	 7(77.8%) 19(54.3%)	 2(22.2%) 16(45.7%)	 0.270
Infiltratıon in chest X-Ray Present Absent	 3(60%) 23(65.7%)	 2(40%) 12(34.3%)	 1.000
Infiltratıon in thorax CT Present Absent	 6(50%) 11(78.6%)	 6(50%) 3(21.4%)	 0.218

Table 4. Laboratory values between preoperative and postoperative patients

Parameter	Group	Mean ± SD	P Value
WBC	Preoperative Postoperative	7885.77 ± 2205.51 8411.11 ± 3694.93	0.583
NEUTROPHIL	Preoperative Postoperative	5660.00 ± 1943.25 6801.67 ± 2944.82	0.17
LYMPHOCYTE	Preoperative Postoperative	1379.62 ± 685.67 983.89 ± 525.58	0.037
HB	Preoperative Postoperative	11.84 ± 2.05 10.71 ± 1.41	0.07
HTC	Preoperative Postoperative	34.79 ± 5.41 32.42 ± 4.30	0.189
PLT	Preoperative Postoperative	241884.62 ± 106476.11 253388.89 ± 167508.08	0.72
GLUCOSE	Preoperative Postoperative	117.23 ± 35.84 119.71 ± 26.83	0.263
CREATININE	Preoperative Postoperative	1.07 ± 0.68 1.29 ± 1.20	0.867
AST	Preoperative Postoperative	25.81 ± 14.27 25.44 ± 14.25	0.971
ALT	Preoperative Postoperative	27.00 ± 18.98 16.61 ± 8.40	0.057
CRP	Preoperative Postoperative	40.93 ± 41.13 86.89 ± 73.53	0.022
PROCALCITONINE	Preoperative Postoperative	0.16 ± 0.15 0.32 ± 0.51	0.829
D-DIMER	Preoperative Postoperative	752.95 ± 618.77 1581.42 ± 1551.70	0.161
APTT	Preoperative Postoperative	28.72 ± 6.91 26.59 ± 4.62	0.498
PTZ	Preoperative Postoperative	12.43 ± 3.92 12.78 ± 1.52	0.398
INR	Preoperative Postoperative	1.13 ± 0.53 1.11 ± 0.13	0.171

HB: Hemoglobine , HCT : Hematocrit , PLT : Platelet , ALT : Alanine aminotransferase , AST : Aspartate aminotransferase, CRP : C-reactive protein , APTT : Active partial thromboplastin time , PTZ : Prothrombin time, INR : International normalized ratio