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ANALYSIS OF PLATELET COUNT AND ITS DIAGNOSTIC PARAMETERS OF SURGERY IN ACUTE APPENDICITIS

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Abstract:

Introduction: *Acute appendicitis (AA), remains the most common indication for emergency abdominal surgery with a lifetime incidence of 7%. Although AA can occur at any age, onset of infection is most common between the ages of 10 and 20 years. AA is more common in males, with a reported male to female ratio of 1.4:1.* ***Objectives of the study:*** *The basic aim of the study is to analyze the Platelet count and its diagnostic parameters of surgery in Acute Appendicitis.* ***Methodology of the study:*** *This study was conducted at Nishtar medical college Multan and Mayo hospital Lahore during March 2018 to July 2018. We retrospectively reviewed the medical records of 241 patients who had undergone appendectomy in the General Surgery Unit. The primary analysis in this study was the comparison of the patient MPV and LC values that at the time of AA to data collected prior to the operation.* ***Results:*** *Diagnostically, the sensitivity, specificity and diagnostic accuracy were 73.1%, 94.0%, and 78% for white blood cell count, 70.0%, 96.0%, and 76.0% for neutrophil percentage, 29.5%, 49.0%, and 34.0% for mean platelet volume, and 97.1%, 93.0%, and 96.0% for platelet distribution width, respectively.* ***Conclusion:*** *Acute appendicitis is the most common indication for emergent abdominal surgery and remains difficult to diagnose. The current study indicates that mean platelet volume is decreased in acute appendicitis.*

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INTRODUCTION:

Acute appendicitis (AA), remains the most common indication for emergency abdominal surgery with a lifetime incidence of 7%. Although AA can occur at any age, onset of infection is most common between the ages of 10 and 20 years. AA is more common in males, with a reported male to female ratio of 1.4:1 [1]. The cause of AA is unknown and is likely to be multi-factorial; luminal obstruction, dietary, and familial factors have all been proposed as potential contributors to AA. The diagnosis of AA can be difficult due to the absence of a pathognomonic signs or symptoms and the poor predictive value of associated laboratory testing. Inflammation plays an important role in the pathology of AA. Laboratory indicators that have been associated with AA include leukocytosis, left shift, and elevated markers of inflammation such as C-reactive protein and erythrocyte sedimentation rate [2]. Mean platelet volume (MPV) is a measure of platelet size generated by full blood count analyzers as part of the routine complete blood count test. Although MPV is not generally taken into consideration by clinicians, it may be a marker of platelet activation. Large platelets are more reactive, produce more pro-thrombotic factors, and aggregate more easily. Mean platelet volume is one of the most widely used surrogate markers of platelet function and has been shown to reflect inflammatory burden and disease activity in several diseases including pre-eclampsia, acute pancreatitis, unstable angina, myocardial infarction, and systemic inflammation such as ulcerative colitis and Crohn's disease [3].

Acute appendicitis (AA) is among the most common urgent abdominal surgical conditions worldwide. The people in Western society have an approximately 8% possibility of having AA during their lifetime. Whereas the diagnosis of AA is usually established clinically, the symptoms and findings may not always typical, in which case the establishment of diagnosis becomes difficult [4]. Rapid and accurate diagnosis is important because extension of the period between the initiation of the symptoms and start of the surgical procedure increases the risk for appendiceal perforation, thereby potentially resulting in sepsis and even death. In addition, the ratio of patients undergoing appendectomy with a normal histopathologic investigation result (negative appendectomy) ranges between 5% and 42%. The morbidity of these patients who are operated on despite the absence of AA is thus increased. The rate of clinical diagnosis of AA is approximately 85% [5]. Although current advanced imaging methods such as ultrasonography, computed tomography and magnetic resonance imaging are promising, they are not adequate. Therefore, novel methods that differentiate AA from nonspecific abdominal pain and reduce the rate of negative appendectomy are needed. Such methods should be inexpensive and convenient, with results obtained in a short time[6].

Objectives of the study

The basic aim of the study is to analyze the Platelet count and its diagnostic parameters of surgery in Acute Appendicitis.

METHODOLOGY OF THE STUDY:

This study was conducted at Nishtar medical college Multan and Mayo hospital Lahore during March 2018 to July 2018. We retrospectively reviewed the medical records of 241 patients who had undergone appendectomy in the General Surgery Unit.

Data collection

The primary analysis in this study was the comparison of the patient MPV and LC values that at the time of AA to data collected prior to the operation. In this study, laboratory and clinical data were obtained from the digital medical records database of the hospital. All patients included in the study had confirmed AA noted in the surgical report. Patients were excluded from the study for: < 15 years of age, having acute or chronic infectious disease, comorbid conditions (cardiac, respiratory, renal, endocrinal, and vascular disease, cancer, *etc*.), hematologic disease and blood transfusion within the last year for any reason, using ongoing medication (analgesics, oral contraceptives, antimetabolites, *etc*.), having a histopathologically normal appendix following appendectomy.

Statistical Analysis

Statistical analyses were performed using SPSS software (SPSS: An IBM Company, version 16.0, IBM Corporation, and Armonk, New York, USA). All data are expressed as the mean ± standard deviation. The Student's *t*-test was used to compare continuous variables between the control and the patient groups. The Pearson correlation analysis was carried out to examine the linear relationships among the variables.

RESULTS:

The comparisons of the laboratory values among the groups are given in Table Table1.1. For all parameters, there were statistical differences between patients and the control groups (*P*s < 0.05).

Table 1: Comparison of the laboratory values between the groups

Variable	(*n* = 50)	*P* values
White blood cell count, × 10^9/μL	12.9 (3.1-25.7)	< 0.001
Neutrophil, %	73.9 (18.0-93.0)	< 0.001
Mean platelet volume, fL	8.5 (6.1-14.2)	0.003
Platelet distribution width, %	49.0 (10.6-86.5)	< 0.001

The diagnostic comparisons of the blood value evaluations are given in Table 2. PDW was the most important diagnostic parameter, followed by WBC, neutrophil percentage and MPV. PDW showed high positive and low negative likelihood ratios. As a result, the diagnostic accuracy for PDW is higher than WBC and neutrophil percentage.

Table 2: Diagnostic comparison of blood parameters

Parameter	Cutoff	AUC (95%CI)	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	PLR	NLR
White blood cell count	10.6 × 10^9/μL	0.87 (0.84-0.91)	73.1	94	97.1	56.0	12.1	0.3
Neutrophil	69.85%	0.87 (0.84-0.91)	70.0	96	97.9	54.2	23.0	0.3
Mean platelet volume	8.98 fL	0.62 (0.55-0.68)	29.5	49	61.1	20.1	0.5	4.5
Platelet distribution width	32.15%	0.95 (0.92-0.98)	97.1	93	97.4	92.1	13.8	0.0

AUC: Area under the receiver operating characteristic curve; DA: Diagnostic accuracy; NLR: Negative likelihood ratio; NPV: Negative predictive value; PLR: Positive likelihood ratio; PPV: Positive predictive value.

DISCUSSION:

AA is the most common cause of "acute abdomen" in all age groups. Although the classical symptomatology and the examination findings of AA are well known, the diagnosis remains quite difficult to make among the causes of abdominal pain. It is important to make a rapid and accurate diagnosis before the complications develop. As AA is an inflammatory process, many authors consider using biomarkers for diagnosis[7]. Among these, WBC is the one most commonly used. Many studies support that WBC is the first indicator to be elevated in appendix inflammation. Acute appendicitis is one of the most common indications for emergency surgery. Appendicitis occurs in patients of all ages, although it is more common among patients 10 to 30 years old. AA is more common in men, with a male to female ratio of 1.4:1. In our study group the mean age of the patients was 33.15±10.94 years (range: 19 to 70 years), and the male to female ratio was 1.5:1, findings that are consistent with the current literature [8].

Both MPV and PDW are markers of platelet immaturity, and an increase in both as compared to controls suggests that young platelets are entering peripheral circulation[9]. PDW is a function of standard deviation of log volume and is also known as the volume change coefficient. PDW is an index of thrombocyte volume heterogeneity, similar to erythrocyte distribution [10]. The heterogeneity of thrombocyte volume occurs due to heterogenic demarcation of megakaryocytes rather than the aging of circulating thrombocytes [11].

CONCLUSION:

Acute appendicitis is the most common indication for emergent abdominal surgery and remains difficult to diagnose. The current study indicates that mean platelet volume is decreased in acute appendicitis. Mean platelet volume has lower diagnostic accuracy than leukocyte count in acute appendicitis, although it can be used as a supportive parameter in the diagnosis of acute appendicitis.

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