Mean Platelet Volume is Reduced in Acute Appendicitis

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SUMMARY

Objectives

Acute appendicitis (AA) is the most common indication for emergency abdominal surgery, although it remains difficult to diagnose. In this study, we investigated the the clinical utility of mean platelet volume in the diagnosis of acute appendicitis.

Methods

The medical records of 241 patients who had undergone appendectomy between June 2013 and March 2014 were investigated retrospectively. Sixty patients who had undergone at least one complete blood count during preoperative hospital admission and who had no other active inflammatory conditions at the time the sample was taken were included in the study. Mean platelet volume and leukocyte count values were determined in each patient at hospital admission and during active acute appendicitis. Age, sex, mean platelet volume and leukocyte counts were recorded for each patient.

Results

The mean age of patients was 33.15±10.94 years and the male to female ratio was 1.5:1. The mean leukocyte count prior to acute appendicitis was $7.42\pm2.12\times10^3/mm^3$. Mean leukocyte count was significantly higher ($13.14\pm2.99\times10^3/mm^3$) in acute appendicitis. The optimal leukocyte count cutoff point for the diagnosis of acute appendicitis was $10.10\times10^3/mm^3$, with sensitivity of 94% and a specificity of 75%. The mean platelet volume prior to acute appendicitis was 7.58±1.11 fL. Mean platelet volume was significantly lower (7.03±0.8 fL) in acute appendicitis. The optimal mean platelet volume cutoff point for the diagnosis of AA was 6.10 fL, with a sensitivity of 83% and a specificity of 42%. Area under the curve for leukocyte count diagnosis was 0.67 and 0.69 for the diagnosis of AA by mean platelet volume.

Conclusions

Mean platelet volume was significantly decreased in acute appendicitis. Mean platelet volume can be used as a supportive diagnostic parameter in the diagnosis of acute appendicitis.

Key words: Acute appendicitis; diagnosis; mean platelet volume.

Introduction

Acute appendicitis (AA), remains the most common indication for emergency abdominal surgery with a lifetime incidence of 7%.[1] 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. 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.[2] The diagnosis of AA can be difficult due to the the absence of a pathognomonic signs or symptoms and the poor predictive value of associated laboratory testing.[3] Inflammation plays an important role in the pathology of AA.[4] 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.[5] 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.[6] 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.[7] 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.[8]

The aim of this study is to investigate the supporting role of MPV in the diagnosis of AA. In the present study each patient's previous MPV and leukocyte count (LC) values, collected under non-inflammatory conditions, were compared with laboratory values from samples taken at the time of AA.

Material and Methods

This study was designed and conducted at Sakarya University Education and Research Hospital. We retrospectively reviewed the medical records of 241 patients who had undergone appendectomy in the General Surgery Unit between June 2013 and March 2014. 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.

The medical records of 241 patients who underwent appendectomy for AA were investigated. Exclusion criteria and the number of excluded patients are listed in Table 1.

A total of 103 patients were excluded from study. Records for the remaining 138 patients were examined retrospectively using the computerized medical records database of the hospital. This evaluation included all records dated withing the previous 6 years. In 78 patients no blood sample data prior to the onset of AA were available. Twenty three patients had a diagnosis of tonsillitis, 18 patients had gastroenteritis, 11 patients had pneumonia, 10 patients had soft tissue infection, 9 patients had renal colic, 5 patients had bone fracture and 2 patients had a diagnosis of acute cholecystitis. As a result, these patients were excluded from study. According to the medical records 60 patients had provided least one blood sample was taken during a previous non-inflammatory state. These patients were included in the study. The clinic where each patient was admitted prior to onset of AA, the diagnosis at this clinic, gender, and the number of patients are shown in the Table 2.

Previous MPV and LC values corresponding to the non-inflammatory state were determined in all 60 patients (Group 1). Mean platelet volume and LC values of the same patients at the time of AA were also determined (Group 2). These values were obtained from the first blood samples collected after onset of AA. Age, sex, MPV and LC values were recorded.

The LC and MPV analyses were performed using a commercially available analyzer (CELL-DYN 3700, Abbott Diagnostics, Abbott Park, IL, USA) in the laboratory. The upper limits of the reference interval for LC was 4600-10200/μL. The expected MPV values in our laboratory ranged between 7.0 and 12 fL.

Statistical Analysis

Statistical analyses were performed using SPSS software (SPSS: An IBM Company, version 16.0, IBM Corporation,

Table 1. Exclusion criteria and number of excluded patients

Exclusion criteria	Number of excluded patients
Patients under the age of 18	2
Pregnant women	9
A history of additional diseases and chronic drug use	19
Patients that had no any hospital admission before operation	73