

Research Paper

MEDICAL SCIENCE

Mean Platelet Volume as A Predictor in Acute Appendicitis

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ABSTRACT Acute Appendicitis is one of the common acute abdomen causes in emergency department. Even that the treatment and follow-up AA is well known, there are some challenges in diagnosing it. There many inflammatory variables studied to increase AA diagnosis accuracy, but non-of them are specific for AA. Hence, many patients are misdiagnosed and undergo false laparotomy. The purpose of this study was to investigate the diagnostic value of Mean Platelet Volume in AA cases in adults.

KEYWORDS : acute appendicitis, mean platelet volume, predicting marker.

Introduction

Acute Appendicitis (AA) is one of the common acute abdomen causes in emergency department (ED). The incidence of AA is parallel with lymphoid system development, therefor the most common age for the AA is adulthood. The incidence in male and females is 1.3:1 respectively(1), and the prevalence in population is % 0.001(2).

Even that the treatment and follow-up AA is well known, there are some challenges in diagnosing it. Patient history and physical examination is the most effective modality in preliminary diagnosis, but is insufficient. Computed tomography of lower abdomen remains to be gold standard, however it involves high radiation risk, and is expensive. There many inflammatory variables studied to increase AA diagnosis accuracy (3-6), but non-of them are specific for AA. Hence, 16% of patients diagnosed as AA undergo false laparotomy (7).

Changes in mean platelet volume (MPV) may be a marker of platelet production as well as an indicator of changes in the severity of several disease states such as sepsis, thrombosis, or even respiratory distress syndrome (8-10). This subject of investigation is studied since 1970s; MPV's relationship with thrombocyte function and activation (11).

Considering all these, we need new, easily applied, cheap, effective and time-saving laboratory methods to facilitate AA diagnosis and decrease negative laparotomy rate.

There are many inflammatory markers that are used in routine AA diagnosing. The purpose of this study was to investigate the diagnostic value of MPV in AA cases in adults.

Patients and Methods

Data is obtained from a state hospital in Turkey. The study covers one year period, from January 1st, 2013 to December 31th, 2013.

In this study we retrospectively investigated the patients that apply to ED with abdominal pain, and other sign and symptoms suggesting AA, and that had been preliminary diagnosed AA. Also, hospital records were scanned for the ICD codes such as K35.9 Acute appendicitis, unspecified, K35.1 Acute appendicitis, with peritoneal abscess, and K35.0 Acute appendicitis with generalized peritonitis, to compile the study patients.

Control group patients were patients admitting to ED with abdominal pain, and preliminary diagnosed as AA according to history and physical examination, and further excluded the diagnosis with sonography. Also, the patients that underwent surgery with AA suspicion, but had negative laparotomy findings for AA.

All the patients' records were scanned for the initial complaints, laboratory findings, ultrasonography findings, operation and pathology findings. In order to analyze relation between AA and laboratory findings, white blood cell (WBC) and mean platelet volume (MPV) values were investigated. Patients with incomplete data were excluded from the study.

The data obtained from this study were analyzed with the SPSS version 15.0 statistical program. Descriptive statistics of the data were used, such as percent, average, and minimum and maximum values. The distribution characteristics of the test were analyzed with a one-sample Kolmogorov–Smirnov test, and dispersion values were within normal limits. The comparison of the groups was performed with the T-sample test statistic, and the significance value was p<0.05.

Results

There were 138 patients in total, preliminary diagnosed with AA, 45% of them were male (63 cases), and 55% of the patients were female (75 cases), and total 10 patients were excluded from the study because of lack of the data. The control group consisted of 27 patients, 4 were excluded.

The distribution of patients included to the study is shown in chart 1.

In order to analyze relation between AA and laboratory findings we investigate white blood cell (WBC) and mean platelet volume (MPV) values. The data is shown in table 1.

The results were as follow: The WBC values were significant higher in AA confirmed group than in control group, both in male and in female (p<0.05) (chart 2). But the MVP values showed no significant difference between the groups (p>0.05).

The WBCs of 83 patients (%79 of the cases), with AA were elevated (normal WBC range taken $4.50-10.0x10^{9}/L$), and only 21 patients' data was within normal limits (%20).

However, the number of patients with AA with normal MPV was found to be 99 (94.3%). No patient with elevated MPV value was reported.

The number of cases with normal WBC and MPV, despite having AA, was 18 (17.1%). The number of those with normal MPV but high WBC was 83 (79%).

Discussion

Alterations in MPV values in inflammatory proses of many diseases have been investigated in several studies; its' prediction value in cardiovascular disease, thrombotic events, ischemic cerebrovascular events, diabetes mellitus, inflammatory bowel diseases, ankylosing spondylitis and rheumatoid arthritis et cetera, have been studied recently (12-17).

There are various studies in literature about MPV predictivity in AA cases, both in children and adults (18, 19). The results are very distinct and conflicting.

In the studies conducted on adult AA cases, most show elevation of WBC value relevant with AA (6, 8, 20). Our study has confirmed these data; we also find WBC values significantly higher in patients with AA. The WBC values of study group were found significantly higher, despite the state that control group's patients have had complaints than could lead to WBC alteration too. This shows that WBC elevation is a valuable positive marker in confirming AA in adults.

Alterations of MPV values in inflammatory events, both increase and decrease of it, have been studied in literature. The negative and positive predictive value of MPV in AA, has been studied too. In their study, Albayrak et al., showed statistically significant decrease in MPV in patients with AA, compared with healthy controls (8).

Besides, in the studies conducted on children Uyanık B. et al. reported no statistically significant difference between groups, according to MPV values (19), and Bilici S. Et al reported MPV significantly lower in the AA group compared to the control group, in children (18). In our study we could not show a relation between MPV values and AA; the data was not significantly different between the groups (p<0.05). Even so, when analyzing MPV data we noticed in that 5.7% of the patients' MPV value was under normal range (<7.20-11.10 fl), and nonof patients in our study had elevated MPV values. This data didn't differ in control group either; 1 patient data under the limit, and no elevated value.

Considering our results, we are close to the results of the studies suggesting that MPV has not a predictive value in AA. Never the less some more comprehensive studies are need to be performed on this subject. Maybe changing cut off value of MPV parameters may give more significant data.

In our study the control group was selected from the patients who have had some complains; for instance nausea, dysuria, abdominal cramps, dysmenorrhea accompanied by abdominal pain. Even though they were not diagnosed as AA, these patients have had an inflammatory state too that could lead to WBC and MPV alterations. And again, the fact that control group has much less patients may effect results. This study can be repeated with a control group patients having no complains. The p values can differ then.

Study limitations

This study has some limitations, considering which a new study may be designed to investigate predictive power of MPV and WBC in AA cases. One of the weaknesses of the study is that we don't know the time of the pain onset or admission time of the patient. So, we cannot evaluate the WBC and MPV values as initiating or late time data. This knowledge probably would change the data. We don't know the patients medication history; whether they have received or not anticoagulant medications, oral contraceptives, or non-steroidal anti-inflammatory drugs (NSAIs). It is well known that this drugs effect the platelet functions.

Charts

Chart 1. Patients included to the study



Chart 2. Laboratory data of the patients.



Tables

Table 1. The WBC and MPV values in study and control groups.

Acute Apendisi- tis Cases	WBC (max) 10º/l	WBC (min) 10º/l	WBC (mean) 10º/l	MPV (max) fl	MPV (min) fl	MPV (mean) fl
Male	25,4	5,8	14,9	11,0	6,6	8,4
Female	21,6	2,6	12,5	11,9	6,7	8,5
Total	25,4	2,6	13,5	11,9	6,6	8,4
Control cases	WBC (max) 10º/l	WBC (min) 10º/l	WBC (mean) 10 ⁹ /l	MPV (max) fl	MPV (min) fl	MPV (mean) fl
Male	11,7	5,6	9,0	10,1	7,0	8,0
Female	19,3	7,0	9,8	9,9	5,5	8,1
Total	19,3	5,6	9,4	10,1	5,5	8,0

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