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RESEARCH ARTICLE

Can We Estimate the Recurrence of Epistaxis with Simple Blood Tests?

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ABSTRACT

Objective: Epistaxis is often treated in the emergency department (ED) and is one of the causes of bleeding that can be successfully managed by physicians. This study aimed to investigate whether there is a relationship between recurrent epistaxis and simple blood parameters (the values of mean platelet volume (MPV) and red cell distribution width (RDW)).

Method: This retrospective case-control study was designed at a tier-three ED. The patients were chosen from among those who applied to the ED for epistaxis between 1 January 2018 and 31 December 2018. Demographic data, seasonal application frequency, complete blood count results and clinical findings were retrospectively reviewed on the hospital information record system. The patients were categorized into three groups of recurrent epistaxis, non-recurrent epistaxis and healthy control groups.

Results: 143 epistaxis patients in total including recurrent (n=73) and non-recurrent (n=70) patients were enrolled in this study. The healthy control group was composed of 77 patients. The MPV value was significantly higher in the recurrent epistaxis group than in the non-recurrent epistaxis group (8.91±1.16, 8.48±1.06, P = 0.006, respectively). In addition, the mean platelet and platecrit values were significantly higher in the non-recurrent epistaxis group than in the recurrent epistaxis group (P = 0.034, P = 0.043, respectively). The high RDW level was found to be statistically significant both in the recurrent and non-recurrent epistaxis groups than in the control group (P < 0.001). The logistic regression analysis concluded that the high MPV value increased epistaxis 1.367 times [OR: 1.367 (0.952-1.963), P = 0.028].

Conclusion: High MPV levels caused an increase in the bleeding tendency in the patients with recurrent epistaxis.

Keywords: recurrent epistaxis, mean platelet volume, emergency department

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INTRODUCTION

It is estimated that about half of the general population will have a nosebleed at least once a year, and about 6% of them require medical care and consult to emergency rooms [1]. Applying to emergency department (ED) due to recurrent epistaxis is related to increased morbidity and high healthcare costs. However, it is not much clear which risk factors cause the case [2]. While it is reported that several localized (e.g. trauma, nasal foreign body, nasal steroid medication, nasal papilloma, allergic rhinitis, etc.) and systemic (e.g. hypertension, coagulopathies, hemorrhagic, metabolic and vascular diseases, etc.) conditions cause epistaxis but the cause of epistaxis is unknown in most cases. It was claimed that nasal colonization of Staphylococcus aureus stimulated inflammation and and increased recurrent epistaxis in the nasal septum [3].

Mean platelet volume (MPV) is a routine whole blood count parameter (CBC) associated with platelet activity used by all physicians. When the metabolic and enzymatic activity was evaluated with platelet size, it was shown that large platelets were more active than small platelets [4,5]. It has been also reported that increased MPV values are related to thrombotic conditions such as atherosclerosis, myocardial infarctus and embolism [6]. Red cell distribution width (RDW), is a routine CBC parameter

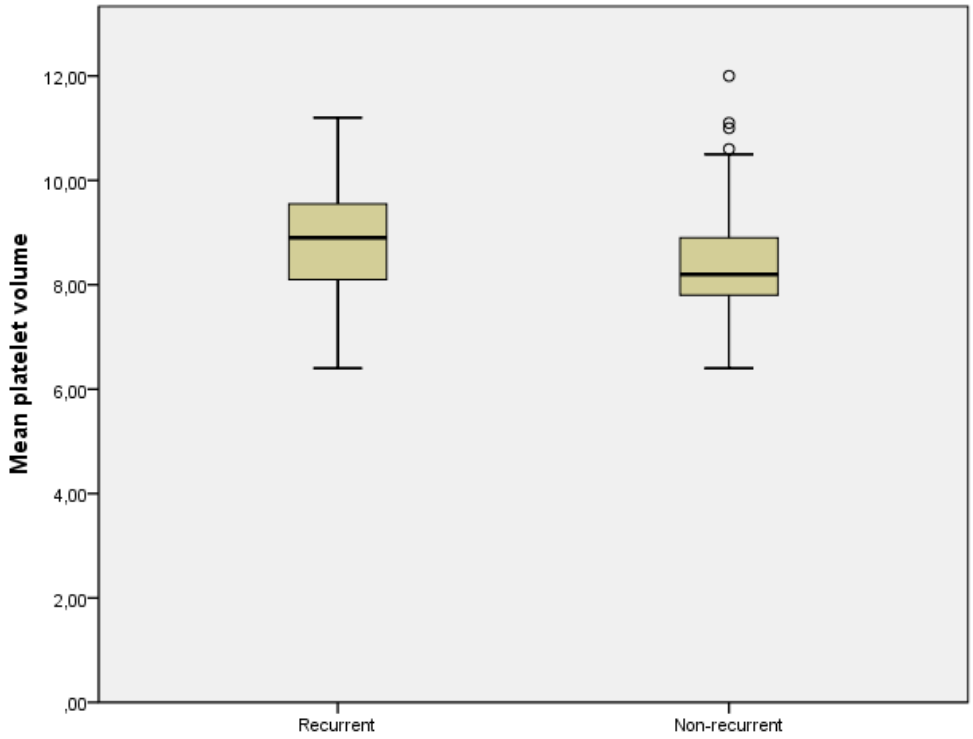

Figure 1. 2013 being adjacent to the intestinal wall, and approximately 35x40mm in size a thick-walled fluid-filled formation was detected

commonly used in the differential diagnosis of anemia, indicates the variation in erythrocyte population and RDW [7]. It has been reported that increased RDW values are in relation with coronary failure, myocarde infarctus, stroke, and malignancy [8-10].

We aimed to determine whether there is a relationship between recurrent epistaxis and simple blood parameters (MPV and RDW).

METHODS

This study was designed retrospectively and case control. The patients were chosen from among those who applied to a tier-three ED for epistaxis between 1 January 2018 and 31 December 2018. For this study ethics committee report was received. The patients who applied to the ED again with the same complaint within 15 days after the epistaxis were considered recurrent epistaxis patients. All the patients were retrospectively reviewed on the hospital information record system. Data including demographic data, seasonal application frequency, complete blood count results and clinical findings were recorded. Autoimmune, inflammatory, polyradiculopathy, rheumatologic disease, pregnancy, traumatic epistaxis, oncologic-hematologic patients, patients with a history of hypertension, chemotherapy patients, structural disorders in nasal examination and age above 18 years old were accepted as exclusion criteria. The patients were categorized into three groups which are recurrent epistaxis, non-current epistaxis groups and control group consisted of healthy patients who came for routine control with similar age and demographic characteristics.

STATISTICAL ANALYSIS

Standard deviation and mean values were calculated for continuous variables, and median and interquartile range of the non-parametric data were calculated. Each of the independent variables was subjected to chi-square test and compared. Multivariate logistic regression analysis was performed to understand the effects of the statistically significant independent variables on recurrent epistaxis. The descriptive statistical analysis of all variables was carried out using SPSS 18.0.

RESULTS

The study group was composed of 143 patients (73 recurrent and 70 non-recurrent) and 77 healthy individuals. Of 73 patients in the recurrent epistaxis group, 52 (71.2%) are male, 21 (28.8%) are female. The non-recurrent epistaxis group involved 44 (62.8%) males, 26 (37.2%) females. Of 77 patients in the control group, 52 (67.5%) are male, 25 (32.5%) are female. As for the seasonal prevalence, epistaxis was observed frequently in winter, but its seasonal prevalence did not differ between the recurrent and non-recurrent groups (P = 0.542). There was no statistically significant difference in the mean age and sex distribution between the epistaxis groups (recurrent and non-recurrent) and the control group. The demographic characteristics of the patients are shown in **Table 1**.

Regarding the CBC parameters, the MPV value was significantly higher in the recurrent epistaxis group than in the non-recurrent epistaxis group (8.91±1.16, 8.48±1.06; P = 0.006, respectively) (**Table 1**, **Figure 1**). Non-recurrent

Table 1. Comparison of demographic and laboratory parameters between groups

	Recurrent epistaxis group n=73	Non recurrent epistaxis Group n=70	Control Group n=77	*p1*	*p2*	*p3*
Age (years)	49.31±19.96	43.72±22.35	40±24.12	0.103	0.054	0.239
Gender (female/male)	21/52	26/44	25/52			
Seasons (n;%)				0.542		
Winter	31 (42.5)	30 (42.9)				
Spring	12 (16.4)	16 (22.9)				
Summer	11 (15.1)	12 (17.1)				
Autumn	19 (26)	12 (17.1)				
Laboratory findings						
WBC (×10³/mm³)	10.04±3.63	9.98±3.84	8.17±2.15	0.629	**<0.001**	0.239
Neutrophil(×10³/mm³)	6.13±2.51	6.08±2.56	4.55±1.68	0.604	**<0.001**	**0.002**
Lymphocytes(×10³/mm³)	2.51±0.97	2.6±1.01	2.67±0.97	0.531	0.242	0.563
Platelets (×10³/mm³)	251.43±109.79	285.78±100.87	255.74±58.76	**0.034**	0.25	0.129
Monocytes (×10³/mm³)	1.17±2.75	0.99±2.37	0.65±0.33	0.428	**0.019**	0.121
Eosinophils (×10³/mm³)	0.18±0.12	0.21±0.15	0.24±0.26	0.232	0.706	0.544
Basophil (×10³/mm³)	0.07±0.09	0.06±0.08	0.05±0.09	0.412	**0.043**	0.199
NLR	2.91±2.07	2.62±1.46	1.95±1.18	0.527	**<0.001**	**0.002**
PLR	113.44±63.98	120.51±55.36	106.04±41.02	0.138	0.951	**0.046**
LMR	3.67±1.68	3.93±1.88	5.7±5.01	0.826	**0.012**	**0.028**
Hemoglobin g/dL	12.55±2.37	12.55±2.13	12.85±2.06	0.841	0.554	0.38
HCT %	38.36±6.74	38.28±5.67	38.86±5.52	0.713	0.864	0.458
MCV fL	85.82±7.25	83.86±10.46	84.02±12.01	0.271	0.509	0.624
MCH pg	27.93±3.01	27.88±3.49	27.91±3.52	0.814	0.987	0.899
MCHC g/dL	32.67±1.33	32.7±1.29	32.49±1.26	0.394	0.519	0.215
RDW %	14.9±1.94	15.13±2.73	13.52±1.03	0.838	**<0.001**	***<0.001***
MPV fL	8.91±1.16	8.48±1.06	8.58±0.09	**0.006**	0.051	0.346
PCT %	0.21±0.08	0.24±0.07	0.21±0.04	**0.043**	*0.793*	**0.024**
PDW %	16.54±1.81	16.33±1.52	15.38±2.72	0.052	**<0.001**	**0.005**

p1 = comparison between recurrent epistaxis group and non-recurrent epistaxis (Group1-2)
p2 = comparison between recurrent epistaxis group and the control group (Group1-3)
p3 = comparison between non-recurrent epistaxis group and control group (Group2-3)
(NLR: neutrophil-to-lymphocyte ratio; PLR: platelet-to-lymphocyte ratio ; MPV: mean platelet volume; LMR: Lymphocyte monocyte ratio; HCT: Hematocrit; MCV: mean cell volume; MCH: mean cell hemoglobin; MCHC: mean cell hemoglobin concentration; RDW: Red cell distribution width; MPV: Mean platelet volume; PCT: platecrit; PDW: Platelet distribution width SD: standard deviation)

epistaxis group's mean platelet and platelet (PCT) values were significantly higher compared to the recurrent epistaxis group (P=0.034, P=0.043, respectively). Mean leukocyte (WBC), monocyte and basophil values of the recurrent epistaxis patients were significantly higher than control group ($P < 0.05$). Furthermore, the mean neutrophil, neutrophil-lymphocyte ratio (NLR) and RDW and platelet distribution width (PDW) values were significantly higher in the epistaxis groups than in the control group. Nevertheless, the mean lymphocyte-monocyte ratio (LMR) was significantly higher in control group compared to epistaxis groups. In addition, control group mean platelet-lymphocyte ratio (PLR) and PCT values were significantly lower compared to the non-recurrent epistaxis group. There were no statistically significant relationships between other variables (**Table 1**). The multivariate regression analysis was performed. Age, gender, MPV, RDW, PCT, platelet, NLR, PLR and LMR were analyzed for determine these parameters on recurrent epistaxis. High MPV value was found to increase epistaxis 1.367 times (OR: 1.367 [% 95 CI: 0.952-1.963]) (**Table 2**).

Table 2. Multivariate logistic regression analysis of different variables for recurrent epistaxis

Variables	Wald	Odds ratio	P
Age	0.882	1.009 (0.991-1.026)	0.348
Gender	2.136	0.568 (0.266-1.213)	0.144
MPV fL	2.87	1.367 (0.952-1.963)	0.028
RDW	4.68	0.967 (0.836-1.119)	0.655
PCT %	3.614	0.011 (0.001-1.149)	0.057
Platelet count (×10³/mm³)	0.179	0.999 (0.994-1.004)	0.673
NLR	0.913	1.16 (0.855-1.573)	0.339
PLR	0.18	0.998 (0.988-1.008)	0.671
LMR	0.003	1.007 (0.793-1.279)	0.954

DISCUSSION

Epistaxis is a common condition that rarely requires applying to ED. Certain patient groups can apply to emergency rooms for recurrent epistaxis [11,12]. Various demographic and risk factors have been described for simple epistaxis events in the literature [12,13]. However, which risk factors are in play for recurrent epistaxis is yet to be fully clarified. Two recent studies reported that the risks factors recognized at the very beginning were not associated with recurrent epistaxis [14,15]. We examined in this study whether there is a relationship between simple complete blood count parameters and recurrent epistaxis. Our study showed that high MPV value increased epistaxis 1.367 times (OR: 1.367 [% 95 CI: 0.952-1.963]) and believe that high MPV value can predict recurrent epistaxis.

MPV is one of the most important parameters routinely taken from many patients that show the function and activity of platelet. The relationship between MPV and bleeding time has been shown by several studies [16]. Studies emphasized that large platelet size and granular and secretion capacity were related, and moreover, increased MPV led to an increase in secretive capacities of thromboxane A2, platelet factor 4 and thromboglobulin [17,18]. Increased MPV values have been found related to myocardial infarctus, coronary failure, stroke and hypertension [19-21]. Goel et al. [22] argued an independent relationship between increased MPV value and ischemic stroke. In a recent study, they reported that MPV might play a predictive role for acute bronchiolitis diagnosis and that MPV's predictive role was better than other inflammatory parameters [23]. Bath et al. found the increase in MPV value to be leading a positively correlational increase in embolic risk [24]. In another study, Karabulut et al. [3] stated that there was a relationship between decreased MPV values and recurrent epistaxis and emphasized that it might be due to the positive correlation between MPV size and platelet. However, our study found high MPV levels caused an increase in the bleeding tendency in the patients with recurrent epistaxis., and it does not coincide with the theory that large platelets are associated with better hemostasis [19,25].

RDW shows changes in the size of red blood cells and is often used to diagnose anemia and shows the heterogeneity of erythrocytes [7]. Studies have shown that RDW is related to vascular events. In one of these studies, it was stated that RDW might be useful in predicting the severity and functional results of stroke in stroke patients having symptoms for <24 hours [26]. In another study, RDW was significantly associated with cardiovascular disease-related deaths in atherosclerosis patients [27]. Goyal et al. [28] stated that RDW is associated with several gastrointestinal disease such as celiac, colon cancer, hepatitis and pancreatitis. Another study found RDW levels to be significantly higher in patients with retinal venous occlusion than in the control group [29]. Kemal et al. [30] found risk of recurrent epistaxis to be higher in patients with low RDW levels than in the normal population. Although RDW level was higher both in the recurrent and non-recurrent groups than in the control group, no significant difference was found between the recurrent and non-recurrent patients (P = 0.838).

Recently, WBC subtypes (NLR, PLR and LMR) have been used as an indicator of systemic inflammatory response [31,32]. In their study, Aksakal et al. [33] found no relationship between NLR and recurrent epistaxis but higher PLR values in the epistaxis group. In our study, no significant relationship was observed between NLR, PLR and LMR and recurrent epistaxis (P > 0.05).

There were some limitations to this study. Firstly, our study was retrospectively conducted in a monocenter manner and with few patients. Secondly, the fact that comorbid diseases which might be related to epistaxis and the possible relationship between the medication used and the epistaxis were not included in the study is the most important limitation. Thirdly, parameters of patients' blood only taken at the moment of application were examined, and it was not possible to compare the basal and subsequent blood parameter values. The fact that these parameters were not compared with acute phase reactants such as CRP and sedimentation which are commonly used is an important limitation. Given the retrospective design of our study, our results need to be confirmed by prospective studies with new hypotheses.

CONCLUSION

High levels of MPV caused an increase in the bleeding tendency in the patients with recurrent epistaxis. In consideration of its unknown mechanism, it would be appropriate to refer these patients for the evaluation of etiological causes.

Declaration of interest: The authors report no conflicts of interest.

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