

Can leukocytosis foresee hysterectomy for placenta previa?

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Abstract

Aim: The frequency of placenta previa (PP) is increasingly rising due to the increase in caesarean ratio. The aim of this study is to investigate the role of the white blood cell (WBC) in the preoperatively taken complete blood specimen in foreseeing whether hysterectomy will be performed or not in patients with placenta previa totalis.

Materials and Methods: Two hundred fifty-seven (257) patients who experienced caesarean due to placenta previa totalis (PPT) in Ondokuz Mayıs University between 2010 and 2018 had been surveyed retrospectively. The results of the preoperative Complete Blood Count (CBC) of the Placenta Previa Totalis (PPT) patients in which either hysterectomy was applied or not, demographic characteristics, other follow-up and treatment results were accessed via system records and file surveys. The primary outcome is the role of preoperative White Blood Cell (WBC) levels in predicting hysterectomy,

Results: WBC median values in the pre-operative complete blood specimen of the patients with placenta previa totalis demonstrate difference between the patients with hysterectomy and those without hysterectomy. While the median value was as $9.7 \times 10^9/L$ in the patients who could be recovered with treatments apart from hysterectomy, this was obtained as $11.31 \times 10^9/L$ in the patients in which hysterectomy was applied ($p=0.007$).

Conclusion: Increase in WBC in the pre-operative blood specimen of the patients with diagnosis of Placenta Previa Totalis may be guiding whether hysterectomy will be applied or not.

Keywords: Placenta previa; hysterectomy; leukocytosis; caesarean.

INTRODUCTION

Morbidly adherent placenta (MAP) is defined as the abnormal implantation of the placenta to the uterine wall. This definition includes placenta accreta, placenta increta, and placenta percreta (1). Although its pathogenesis is unclear, it may result from abnormal vascularization and trophoblastic invasion due to ischemia in the scar tissue following uterine surgery (2). The risk factors for MAP include the presence of placenta previa (PP), previous uterine surgery, multiparity, hypertensive diseases, and smoking (3). MAP is a serious obstetric pathology that can lead to lethal hemorrhage, disseminated intravascular coagulation (DIC), hysterectomy, and injuries in the urinary bladder and other organs of the patients (4). Detecting the invasion of placenta after the diagnosis of PP is crucial for determining treatment of patient (5). Currently, experience is vital in the ultrasonographic diagnosis

of placental invasion. In addition, magnetic resonance imaging (MRI) is an examination method with a higher cost. Nevertheless, placental invasion is a condition that should be detected before surgery, as this is necessary for surgical planning and informing patients about the possibility of hysterectomy. Therefore, this study aimed to investigate the role of complete blood parameters in foreseeing hysterectomy for patients who were diagnosed with placenta previa totalis (PPT).

MATERIAL and METHODS

Study Design: A total of 257 patients with PPT who were hospitalized in between 2010 and 2018 were surveyed retrospectively. The records in the hospital computer system and patient files were used for data collection. The demographic characteristics and complete blood count (CBC), which were taken preoperatively, were recorded.

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Setting: Ondokuz Mayıs University.

Inclusion criteria: Patients diagnosed with PPT preoperatively and postoperatively who had single-birth pregnancies and pregnancies lasting 22 weeks or longer were included in the study.

Exclusion criteria: Patients with partial and marginal PP, maternal chronic disease, preeclampsia, gestational diabetes, the hemolysis, elevated liver enzymes and low platelet count (HELLP) syndrome, hemorrhagic diathesis, chorioamnionitis, or an other infectious diseases and an intrapartum or postpartum fever of more than 37.5, with preoperative transfusion were excluded from the study.

Patients who could be treated via compression sutures and the Bakri balloon were categorized as group 1, whereas patients in which hysterectomy should be performed although all of these steps were applied were categorized as group 2. There is 3 patients in group 1, 60 patients in group 2.

The primary outcome is the role of preoperative White Blood Cell (WBC) levels in predicting hysterectomy,

Statistical methods: Data were analyzed with IBM SPSS V23. Compliance with normal distribution was examined by Shapiro Wilk. Independent samples t test and Mann Whitney U test and Kruskal Wallis test were used for comparison of normal distribution data. Chi-square test was used for comparison of categorical data. The results of the analyzes were presented as mean, s-deviation, and those that were not normally distributed as median (min-max). Categorical data were expressed as frequency (percentage). Significance level was taken as $p < 0.05$.

RESULTS

The median age of the patients included in the study was 32 years. The number of gestations median value was 3. The median gestation period was 256 days (36.1 weeks). The median cesarean number was 2 (Table 1).

Table 1. Demographic data

	Median (min-max)
Age	32 (19 - 50)
Number of gestation	3 (1 - 9)
Gestation period (days)	253 (117 - 288)
Number of previous cesareans	2 (1 - 5)

In the preoperative CBC specimen, white blood cell (WBC) and neutrophil (NEU) levels were significantly different between group 1 and group 2 ($p=0.007$ and $p=0.021$, respectively). In addition, hemoglobin (Hb), hematocrit (Htc), erythrocyte (red blood cells; RBCs), and red cell distribution width (RDW) values were significantly different between group 1 and group 2 ($p=0.001$, $p=0.001$, and $p=0.008$, respectively). The mean platelet volume (MPV) values were significantly different between group 1 and group 2 ($p=0.021$).

DISCUSSION

The frequency of PP is increasing due to an increase in the cesarean ratio. The most important decision point in the PP treatment process is foreseeing whether the placenta is adherent. Currently, the invasion of the placenta may be detected by ultrasonography or MRI (6). However, this requires extensive experience and is typically evaluated in a subjective manner. Nevertheless, determining whether

Table 2. Laboratory values pre-operatively seen in group 1 and group 2

	Group 1 (197)	Group 2 (60)	p
White Blood Cell (WBC) thousands per microliters	9.7 (4.9 - 21.6)	11.3 (6.1 - 26.2)	0.007
Red Blood Cell Distribution Width (RDW) %	14.5 (12.3 - 24.7)	15.2 (13.6 - 37)	0.008
Red Blood Cell (RBC) millions per microliters	3.9 (1.9 - 5.2)	3.1 (1.4 - 5.6)	<0.001
Platelets (PLT) thousands per microliters	218 ± 68.7	193.9 ± 72.8	0.066
Platelet Distribution Weight (PDW) femtoliters	52.8 (8.5 - 77.5)	55.5 (10.2 - 73)	0.174
Neutrophil %	73.4 ± 7.7	74.4 ± 11	0.542
Neutrophil thousands per microliters	7.1 (3 - 17.3)	8.4 (4.5 - 21.7)	0.021
Monocyte thousands per microliters	4.9 ± 1.7	4.5 ± 1.8	0.197
Monocyte %	0.5 (0.1 - 1.5)	0.5 (0.2 - 2.2)	0.350
Mean Platelet Volume (MPV) femtoliters	7.1 (3 - 17.3)	8.4 (4.5 - 21.7)	0.021
Mean Corpuscular Volume (MCV) femtoliters	88.9 (63.4 - 97.4)	88.3 (74.9 - 105.8)	0.794
Mean Corpuscular Hemoglobin Count (MCHC) grams per deciliters	33.5 ± 1.3	33.4 ± 1.4	0.525
Mean Corpuscular Hemoglobin (MCH) picograms	29.8 (20.9 - 34.5)	29.7 (24.7 - 35.3)	0.844
Lymphocyte %	19.1 (4.1 - 46)	17 (8.1 - 53)	0.184
Lymphocyte thousands per microliters	1.8 (0.7 - 4.5)	1.9 (0.7 - 10)	0.115
Hemoglobin(grams per deciliters)	11.2 ± 1.9	9.1 ± 2.9	<0.001
Hematocrit %	34.2 (16.9 - 43.8)	26.6 (13.1 - 59.1)	<0.001
Eosinophil %	0.8 (0 - 4.1)	0.8 (0 - 5.9)	0.621
Eosinophil thousands per microliters	0.1 (0 - 0.4)	0.1 (0 - 1.3)	0.151
Basophil %	0.3 (0 - 2.2)	0.2 (0 - 2.2)	0.308
Basophil	0 (0 - 0.4)thousands per microliters	0 (0 - 0.4)thousands per microliters	0.736

the placenta is adherent is crucial for patient management. High levels of alpha-fetoprotein (AFP), human chorionic gonadotropin (HCG), and pregnancy-associated plasma protein A (PAPP-A) in the maternal serum could be used in the estimation of the presence of adherent placenta (7,8). In this study, WBC and NEU levels were higher in cases of adherent PP, which required hysterectomy. During pregnancy, there is a physiologic increase in WBCs. A WBC value of $15 \times 10^9/L$ to $20 \times 10^9/L$ would be considered as normal (9). The occurrence of leukocytosis following delivery is considered as a physiologic response, and the value can increase to $20 \times 10^9/L$ to $30 \times 10^9/L$ (10). Several theories have been proposed to explain this physiologic response. During pregnancy, causes such as the body mass index (BMI), consumption of tobacco, and chorioamnionitis may lead to an increase in the leukocyte value (11,12). During delivery, the method of delivery and the anesthesia type could affect WBC values (13). Catecholamine discharge due to the stress has been reported to lead to leukocytosis in pregnant females and puerperant females. An increase in leukocytosis in response to pain has been demonstrated in the previous study (13). In another study, leukocyte levels were higher in patients with primary postpartum hemorrhage than in normal patients; on the other hand, Hb levels were lower in patients with primary postpartum hemorrhage (14). Based on the results of this study, the higher WBC count and higher number of NEUs in patients who underwent hysterectomy may be attributed to the higher prevalence of stress and inflammation in these patients. Placental invasion may lead to an inflammatory response. Therefore, the leukocyte number, which can be increased during pregnancy as a normal physiologic response, may contribute to the prognosis of patients who have PP. Moreover, it is easier than ultrasonographic assessment and does not require experience, which would be an advantage. In addition, this study found that preoperative Hb and hematocrit levels were lower in patients who underwent hysterectomy. Previous studies have indicated that anemia can increase primary postpartum hemorrhage and has an inhibiting effect on the contraction of the uterine muscles (15). There are some limitations in this study; it is a retrospective study, and it has no control group. There is a need for larger studies about in this subject.

CONCLUSION

Increase in WBC in the pre-operative blood specimen of the patients with diagnosis of Placenta Previa Totalis may be guiding whether hysterectomy will be applied or not. But prospective studies with larger populations are required. Nevertheless, it can serve as a guidance for future studies.

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