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Platelet indices in patients with colorectal cancer

Research Article

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Abstract: The interaction between cancer cells and platelets has been known for a long time. Although platelet indices have been also investigated in several clinical settings, it has not been exactly demonstrated in cancer patients. We investigated platelet indices in colorectal cancer patients and compared with healthy subjects. Two hundred and twenty-one colorectal cancer patients and 110 healthy subjects were enrolled into the retrospective study. Data were obtained from computerized medical records of our hospital. Medical record review was performed for all patients regarding thrombocyte indices. Platelet count (325.000/mm3 ± 265.000/mm3 vs 267.000/mm3 ± 67.000/mm3; p=0.025; respectively) and plateletcrit (Pct) (0.25% ± 0.10 vs 0.21 ± 0.05; p<0.001; respectively) were increased in patients compared with healthy subjects while mean platelet volume (MPV) and platelet distribution width (PDW) were similar. The platelet indices were not related to existence of metastasis or acute abdomen. Platelet count and Pct, but not MPV and PDW, are elevated in colorectal cancer patients. Future studies that investigate platelet morphology, function, and putative role of platelets in tumorigenesis and metatasis should be established.

Keywords: *Colorectal carcinoma • Mean platelet volume • Platelet indices*

1. Introduction

The interaction between cancer cells and platelets has been known for a long time. In cancer patients, platelet activation and thromboembolic events frequently occur [1-3]. Thrombocytosis is also observed in patients with cancer including colorectal cancer and elevated platelet count is associated with poor survival [4-6]. Platelets are also considered to play a role in metastasis. Aksoy et al. [7] investigated mean platelet volume (MPV) values in the diagnosis of bone marrow metastasis in patients with solid tumors and they found that the mean MPV in patients with marrow metastasis is lower than in patients without metastasis. We previously found that thrombocytosis is a prognostic factor in stage II colon cancer [8].

The platelet indices have been also investigated in several clinical settings. Mean platelet volume (MPV) is found to be a risk factor for myocardial infarction [9-11]. It is also reported in several studies that MPV values are higher in patients with diabetes mellitus [12-14]. Platelet distribution width (PDW) is an indicator of variation in platelet size, which can be a sign of active platelet release. It has been demonstrated that PDW and MPV are also altered in several conditions [15,16]. These platelet parameters have not been studied overall in cancer patients.

We investigated the variation of platelet indices in colorectal cancer patients and compared them with healthy subjects.

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2. Material and Methods

In this retrospective study, 221 colorectal cancer patients (Patient group) and 110 healthy subjects (Control group) were enrolled. The mean ages of the groups were identical. Pretreated (before chemotherapy, radiotherapy, or tumor surgery) hematological parameters were collected. Data from patients and healthy subjects from nursing homes of hospitals or check-up centers (healthy control) were obtained from the computer-based patient record of our hospital. An automated blood counter (Coulter Gen-S, Minnesota, MN, USA) had been used for complete blood count (CBC). Patients who did not have their CBC performed by this analyzer were excluded. Patient's age, gender, diagnosis, stage, platelet count, plateletcrit (Pct), PDW and MPV values were documented. Data were analyzed with SPSS software. Student T test and Chi square test were used for comparing groups.

3. Results

Eighty-five cases of the patient group were female (38.5%), while thirty-eight of healthy subjects were female (34.5%). Fifty-four of the colorectal cancer patients (24.4%) had metastasis. Thirty-three patients (14.9%) were admitted with acute abdomen due to perforation or ileus as initial presentation. The characteristics of patients and healthy subjects are shown in Table 1.

With respect to hematological parameters, white blood cells (WBC) were decreased in colorectal cancer patients compared with healthy subjects. The parameters of red blood cells in the patient group were lower than that of the control group. Platelet count and Pct were increased in patients, while MPV and PDW were not different (Table 2). Forty-one colorectal cancer patients (18.6%) and only 6 healthy subjects (5.5%) had high platelet count (≥400.000/mm3) (p=0.01).

Table 1. The characteristics of patients and healthy subjects.

	Patients	Controls
Age		
Median	70	76.5
Range	20-90	22-95
Gender		
Male	136 (61.5%)	72 (65.5%)
Female	85 (38.5%)	38 (34.5%)
Stage		
I	29	
II	75	
III	63	
IV	54	
Acute abdomen (in first presentation)	33 (14.9%)	
Tumor localization		
Ascending colon	37	
Transverse colon	14	
Descending colon	50	
Rectum	109	
Undetermined	9	

The platelet indices were not different in metastatic colorectal cancer patients when compared with those without metastasis. These indices were also similar in patients who presented with and without acute abdomen (Table 3). These platelet parameters were not different among stages and among tumor localizations (Data have not been shown).

4. Discussion

We aimed to compare platelet indices in colorectal cancer patients with healthy subjects in this study. We found that platelet count and Pct are higher in patients than in healthy subjects while MPV and PDW are similar. There are limitations in this study. First, morphology and functional tests of platelets were not studied. Second,

Table 2. Hematological perimeters in patients and healthy subjects.

		Patients			Controls			p
White blood cells	/mm^3	8990	±	5090	7000	±	1490	<0.001
Red blood cells	10 6/mm^3	4,31	±	0,95	4,51	±	0,50	0,049
Hemoglobin	gr/dL	11,72	±	1,94	13,46	±	1,60	<0.001
Hematocrit	%	35,61	±	5,52	39,66	±	4,75	<0.001
Mean corpuscular volume	fL	83,36	±	9,79	88,36	±	5,61	<0.001
Platelet count	x1000/mm^3	325	±	265	267	±	67	0,025
Plateletcrit	%	0,25	±	0,10	0,21	±	0,05	<0.001
Mean platelet volume	fL	8,49	±	4,34	8,07	±	0,91	0,325
Platelet distribution width	%	16,16	±	0,77	16,12	±	0,84	0,664

Table 3. Platelet indices in the patient group.

	With acute abdomen	Without acute abdomen
n	33	188
Platelet count	380 ± 636	315 ± 113
Plateletcrit	0,24 ± 0,10	0,25 ± 0,10
Mean palatelet volume	8,62 ± 0,95	8,46 ± 4,70
Platelet distribution width	16,27 ± 0,74	16,14 ± 0,77
	Metastatic disease	Non-metastatic disease
n	53	133
Platelet count	291 ± 104	336 ± 298
Plateletcrit	0,24 ± 0,13	0,25 ± 0,09
Mean palatelet volume	8,30 ± 1,17	8,55 ± 4,94
Platelet distribution width	16,29 ± 0,90	16,11 ± 0,72

All p values are higher than 0.05

survival data analysis was not done. Lastly, the study should be conducted prospectively for better results.

We previously evaluated whether or not thrombocytosis is a prognostic factor in stage II colon cancer [8]. Out of 198 patients, 24 (12.1%) had thrombocytosis, and its presence correlated with tumour depth and lymphatic invasion. The disease-free survival and overall survival were shorter in patients with thrombocytosis than in node-negative colon cancer patients. Pedersen et al. [4] investigated thrombocytosis in 1115 lung cancer patients and found the prevalence of thrombocytosis to be 32%. This percentage was higher than in control subjects. Patients with thrombocytosis had a significantly poorer survival rate than those with normal platelet counts. In our study, 41 colorectal cancer patients had higher platelet counts (>400.000 per microliter), but survival analysis was not performed.

Aksoy S et al. [7] investigated MPV value in the diagnosis of bone marrow metastasis in solid tumor patients and they found that mean MPV in patients with marrow metastasis is lower than in patients without metastasis. We did not find any difference between metastatic and non-metastatic disease.

Microvessel density and platelet count were increased in NSCLC patients and both are prognostic in follow up [5]. Platelets release angiogenic growth factors and adhere to tumor microvessels. Platelet extravasation occurs into the extracellular matrix via increased vascular permeability. This process leads to platelet activation. MPV and PDW are indicators of platelet activation and size variation. However, we did not find any difference regarding MPV and PDW between patients and healthy subjects.

In conclusion, MPV and PDW are not altered but platelet count and Pct are elevated in colorectal cancer patients. These platelet parameters are not related with stage or acute abdomen as presenting signs. Future studies that investigate platelet morphology, function, and putative role of platelets in tumorigenesis and metatasis should be established.

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