RESEARCH ARTICLE

Can Head and Neck Cancers Be Detected with Mean Platelet Volume?

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Abstract

Background: Mean platelet volume (MPV) is a marker which has been investigated in many cancers but data for head and neck lesions are limited. We aimed to study the MPV levels in head and neck cancers as a diagnostic marker. Materials and Methods: A total of 96 head and neck cancer patients and 31 control patients who did not meet exclusion criteria were enrolled in the study. The cancer locations, the platelet and MPV levels at the first diagnosis time were collected. Results: The head and neck cancer location distribution between these patients was 2 (2.1%) buccal, 9 (9.4%) tongue, 6 (6.3) lip, 1 (1%) gingiva, 1 (1%) hypopharynx, 1 (1%) ear, 58 (60.4%) larynx, 2 (2.1%) maxilla, 2 (2.1%) nasal, 1 (1%) nasopharynx, 2 (2.1%) palatal, 3 (3.1%) primary unknown, 1 (1%) retromolar, 1 (1%) thyroid, 2 (2.1%) tonsil, and 4 (4.2%) salivary gland. MPV levels were significantly different between cancer and control group (p=0.002). The cut-off point for MPV predicting head and neck cancer is >10 fL (sensitivity=55.21, specificity=87.10). Conclusions: MPV level increase, a readily assessable parameter which does not bring extra costs can warn us regarding head and neck cancer risk.

Keywords: Head and neck cancer - mean platelet volume - risk factor

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Introduction

Each year head and neck cancers are diagnosed frequently worldwide and are the eight most seen cancer (Ferlay et al., 2010). There is a lack in clinically proven markers in the diagnosis from the head and neck cancers. Mean platelet volume(MPV) is a marker which is investigated in many cancers except head and neck cancers (Afsar et al., 2014; Ay et al., 2015; Baldane et al., 2015; Kumagai et al., 2015). MPV is showing the platelet size. Platelet with higher volume are associated with increased thrombotic potential and reactivity (Karpatkin et al., 1978; Braekkan et al., 2010).

The MPV level can be significant as a biomarker in head and neck cancers and it can be cautionary for thrombosis risk in these cancers. The thrombosis in head and neck cancers are mentioned in some studies (Niksic et al., 1976; Dong et al., 2001; Paneesha et al., 2010).

The aim of the study was to evaluate the MPV levels in head and neck cancers as a diagnostic marker.

Materials and Methods

The files from histopathologic revealed head and neck cancer patients between January 2013 and April 2015 in our hospital were retrospectively reviewed. The study was approved by the Adnan Menderes University Faculty of Medicine Clinical Research Ethical Committe (2015/596). Patients with haematologic disorders, cardiac disorders, autoimmune diseases, inflammatory or infective diseases, endocrinologic diseases, with other site cancers, hepatic and renal diseases and taking drugs which affect the coagulation cascade were excluded from this study. The patients nor took radiochemotherapy nor surgery at the reviewed time. A number of 96 patientswho were out of the exclusion criteria were enrolledin the study. The healthy control group of 31 patients were randomly choosen from patients who were healthy in examination and were matched for exclusion criteria. The medical records were reviewed and the cancer locations, the platelet and MPV levels at the first diagnosis time were collected. In our laboratory the MPV values were measured within 120 minutes after venipuncture and the range of MPV is 9,4-12,3 fL.

Statistical analyses

All data were tested for normality using Kolmogorov-Smirnov test. For age variable, the independent sample-t test was used to detect difference among two groups, and descriptive statistics were presented as mean±standard deviation. For other variables, the Mann-Whitney U test was used to detect difference among two groups, and descriptive statistics were presented as median (25-75 percentiles). ROC curve of MPV predicting head and neck cancer was constructed. The area under the curve (AUC), cut-off point, sensitivity and specificity values were calculated by ROC curve. For gender, chi-square test was used. p value less than 0.05 was considered

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statistically significant.

Results

96 head and neck cancer patients were involved in this study. 31 control patients were involved. There was no statistically significant diference among groups regarding age and gender (Table 1). The head and neck cancer location distribution between these patients is 2(2.1%) buccal, 9(9.4%) tongue, 6(6.3) lip, 1(1%) gingiva, 1(1%) hypopharynx, 1(1%) ear, 58(60.4%) larynx, 2(2.1%) maxilla, 2(2.1%) nasal, 1(1%) nasopharynx, 2(2.1%) palatal, 3(3.1%) primary unknown, 1(1%) retromolar, 1(1%) thyroid, 2(2.1%) tonsil, 4(4.2%) salivary gland cancers.

The platelets were not significantly different between cancer and control group (p>0.05). MPV levels were significantly different between cancer and control group (p=0.002) (Figure 1). The MPV median values are 10.2 (9.5-11.1) in cancer group and 9.7(9-10) in control group.

Table 1. Demographic Features and MPV, Platelet Results from the groups

	Cancer(n=96)	Control(n=31)	p
Age (years)	64.5(57-70.8)	59(52-69)	0.093
Gender (male/female)	77/19	23 8	0.646
Platelets (x10^9/l)	238.5(201.8-310.3)	241(192-266)	p>0.05
MPV (femtoliters,fL)	10.2(9.5-11.1)	9.7(9-10)	0.002*

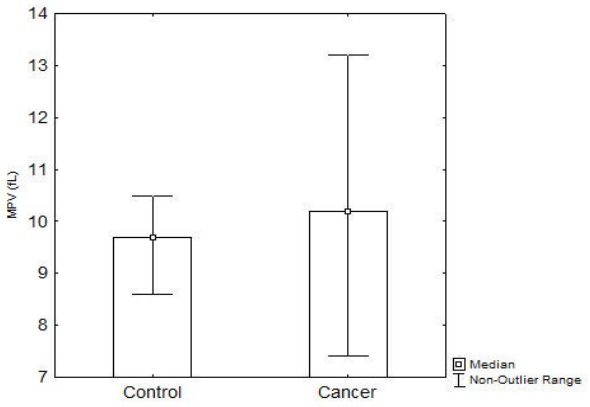

Figure 1. Median MPV from Head and Neck Cancers and Control Group

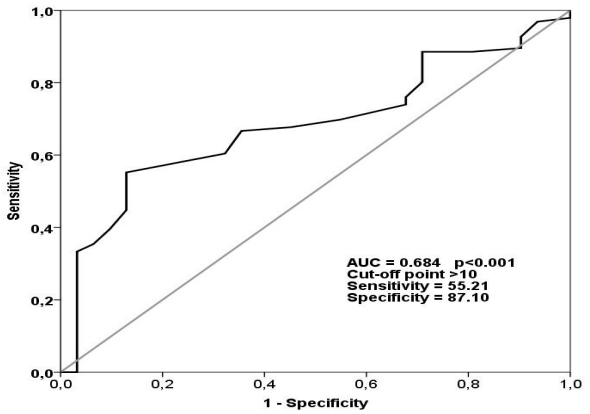

Figure 2. ROC curve of MPV Predicting Head and Neck Cancer

ROC curve of MPV predicting head and neck cancer is shown in figure (Figure 2). The AUC is 0.684 (p<0.001). The cut-off point from MPV is >10 fL (sensitivity=55. 21, specificity=87.10).

Discussion

This study demostrated that head and neck cancer patients had higher MPV levels than controls. The other parameters like MCV and platelets showed no difference between cancer and control groups.

The cut-off point from MPV in our study is detected >10 fL with a sensitivity of 55.21 and specificity of 87.10. In a research the MPV value in colon cancer cases was mostly >11.8 fL (Li et al., 2014). In an other research the preoperative cut-off point from MPV in papillary thyroid carcinoma was >7.8 fL with a 60% of sensitivity and 80% of specificity (Baldane et al., 2015). In our study the sensitivity from MPV was lower than this study.

MPV shows the activity from platelets. Larger platelets have more reactivity than smaller ones (Mangalpally et al., 2010). The correlation between MPV and cancer was analyzed in different types of cancers (Afsar et al., 2014; Baldane et al., 2015). Thyroid papillary carsinomas had higher MPV levels than beningn goiter patients and controls and in the same research the MPV levels decreased after surgical treatment (Baldane et al., 2015).

MPV can be used as a marker for angiogenesis in cancer patients because of the angiogenic, metastatic, proteolytic role of platelets in cancer inflammation (Kisucka et al., 2006). Tumor cells release procoagulant, fibrinolytic factors, mediators, proteases, cytokines which have a direct effect of the platelet production, activation and they directly interact with platelets through adhesion molecules (Noble et al., 2010; Bagoly et al., 2015). A research about this was made by Mutlu et al. (2012) They apllied an anti-angiogenic agent bevacizumab which reduced the MPV levels in metastatic colon cancer patients (Mutlu et al., 2012).

Dong et al. (2001) studied the coagulation state in laryngeal cancer patients. They detected a decreased anticoagulant activity and increased fibrinolytic activity in laryngeal cancer patients before operation (Dong et al., 2001). This result can be parallel with our high MPV levels in head ad neck cancers. The majority of our cases were laryngeal cancers. There is a caution for thrombosis in head and neck surgery but we see that even without surgery the head and neck cancer patients have a hypercoagulability associated with tumor cells. The MPV level can be used as a marker for the possibility of cancer and thrombosis in these cases.

An other resaerch about hypercoaculability in laryngeal and pharyngeal cancers detected hypercoaculability in 8 cases of 41 larynx tumors and 6 of 7 pharynx tumors (Niksic et al., 1976).

Baicus et. al. reported that MCV and platelet levels were not associated in cancer patients (Baicus et al., 2011). In our study we also found no difference between groups in MCV and platelets.

The limitations from our study are to be retrospective and a relatively low sample number. Also the high MPV

level may warns us for the thrombosis risk in these cases. Further researches can be done for the thrombosis in head and neck cancers with high MPV levels.

MPV may be used as a new marker in the diagnosis of head and neck cancers. MPV level increase, such an easy parameter which does not bring extra costs can warn us for the head and neck cancer risk.

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