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Is mean platelet volume a predictive marker for sudden sensorineural hearing loss?

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Abstract

Objective: There are many factors considered to be related with the etiology of sudden sensorineural hearing loss (SSNHL) such as viral infections, microvascular diseases and inflammation. Increased mean platelet volume (MPV) levels are assumed to represent more active enzymatic process and thrombotic predisposition. Our aim in this study is to show whether MPV could be a predictive value in SSNHL or not.

Methods: The medical records of a total of 93 patients with SSNHL and 93 healthy controls were reviewed retrospectively in this study. Peripheral blood MPV values of both groups were compared statistically.

Results: Mean platelet volume levels did not show a statistically significant difference between these groups.

Conclusion: As a result of our study, we consider MPV is not a predictive parameter in idiopathic SSNHL.

Keywords: Mean platelet volume, sudden deafness, thrombosis.

Özet: Ortalama trombosit hacmi ani işitme kaybı için prediktif bir değer midir?

Amaç: İdiyopatik ani sensörinörinal işitme kaybının (AİK) etiyolojisinde viral enfeksiyonlar, mikrovasküler hasar ve inflamasyon başta olmak üzere birçok etken suçlanmıştır. Artmış ortalama trombosit hacmi (MPV) değerleri daha aktif enzimatik süreç ve trombosit predispozisyonu ile ilişkilidir. Çalışmanın amacı MPV ile AİK arasındaki ilişkiyi araştırmaktır.

Yöntem: Çalışma retrospektif olarak hasta kayıtlarının taranması ile yapıldı. AİK tanısı konulan 93 hasta ve 93 sağlıklı kontrol grubu çalışmaya dahil edildi. Grupların periferik kan MPV değerleri istatistiksel olarak karşılaştırıldı.

Bulgular: Her iki grup arasında MPV değerleri açısından istatistiksel olarak anlamlı farklılık bulunmadı.

Sonuç: Çalışmamızın sonuçlarına göre MPV, idiyopatik AİK için prediktif bir parametre değildir.

Anahtar sözcükler: Ani işitme kaybı, MPV, tromboz.

Sudden sensorineural hearing loss (SSNHL) is the loss of hearing in three or more contiguous frequencies at least 30 dB or more, over three days or less. SSNHL makes up 1% of all sensorineural hearing loss cases with an incidence reported between 5–20/100,000.[1] While certain etiology is still unknown, viral infections, autoimmune diseases and vascular pathologies are assumed to be involved.[1,2] Vascular pathologies are believed to cause SSNHL via hypoxia or free radical damage like pathways.[3] It has been recently reported that hypercoagulopathy and increased fibrinogen levels may be associated with SSNHL.[4]

Platelets are the small components of peripheral blood cells, which function in hemostasis and vascular integrity. These cells secrete chemical mediators and play parts in inflammation, coagulation, thrombosis and atherosclerosis-like processes.[5] Platelets differ in size, volume and hemostatic activities. Mean platelet volume (MPV) is an objective marker that can easily be measured in peripheral blood. This ratio also represents platelet activities with increased MPV levels reflecting enzymatic and metabolically active platelets that are more effective in thrombus formation.[6]

The aim of the present study was to figure out whether MPV is a predictive value for SSNHL or not.

Materials and Methods

This study was held retrospectively via patient records. A total of 93 patients diagnosed with SSNHL in our clinic

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between January 2008 and May 2016 and 93 healthy controls who applied for routine health check and had audiometric evaluation, similar to the study group in terms of age and gender, were enrolled in this study. The study got the approval from the local ethic committee of the hospital. The patients who had 30 dB or more loss in 3 contiguous frequencies in pure-tone audiometry within 3 days had the diagnosis of SSNHL. Exclusion criteria were having active inflammation, suspicion of an autoimmune inner ear disease, a discovered etiology for SSNHL, history of otologic surgery or head and neck trauma, previously diagnosed cardiovascular disease, chronic disease like diabetes mellitus, hypertension, hyperlipidemia, obesity, antiaggregant or anticoagulant drug use, chronic alcohol consumption and smoking. MPV levels were recorded via the retrospective analysis of full blood counts. Cell-Dyn Ruby® multi-parameter cell counter device was used for measurements (Abbott Laboratories, Abbott Park, IL, USA).

In descriptive statistics of the data; mean, standard deviation, median minimum, maximum, frequency and ratio values were used. Distribution of variables was assessed by Kolmogorov-Smirnov test. Mann-Whitney U test was used in the analysis of quantitative data. SPSS 22.0 (PASW for Windows®; SPSS Inc., Chicago, IL, USA) program was used in the analyses.

Results

A total of 186 individuals (93 patients and 93 healthy controls) were enrolled in this study. Female to male ratio was 52/41 in the study group and 47/46 in the control group. Mean age was 32.3±7.9 years in the study group and 31.4±8.1 in the control group. Mean MPV in the study group was 8.2±2.2 (range: 6.9–16) fL and it was 8.7±1.3 fL in the control group (Fig. 1). There was no statistically significant difference between these groups (p=0.465).

Discussion

Sudden sensorineural hearing loss is a disease without a known etiopathology and generally thought to occur as a result of idiopathic and multifactorial subjects. SSNHL was tried to be explained by various hypotheses. The most highlighted causes are viral infections, inflammation and hypoxia. As cochlear artery is a terminal branch of anterior inferior cerebellar artery (AICA), any pathology in this location may damage cochlea and cause hearing loss.[6]

Platelets are heterogeneous cell groups in peripheral blood and big platelets with more granules are associated with more secretion of mediators, more glycoprotein receptor expression, and they are associated with a faster aggregation as a result.[7] MPV is an objective marker that can easily be measured in peripheral blood and its correlation with several diseases is reported in literature. Increased MPV has been associated with vascular endothelial damage and some cardiovascular diseases.[8–10] Also inflammatory bowel diseases like ulcerative colitis and Crohn's disease is reported as associated with high MPV values.[11] Today, its clinical significance has not been accepted yet.

In our study, we tried to evaluate the association between MPV levels and SSNHL in which vascular pathologies are considered to involve in the etiopathogenesis. We did not find a significant difference in MPV levels, between healthy controls and SSNHL patients group. Ulu et al.[12] reported that MPV levels were higher in SSNHL patients, compared to controls, with 40 patients, and stated that due to low number of patients, it should be supported by other studies. Similarly, Sagit et al.,[3] in a study of 31 patients, they found a positive correlation between SSNHL and MPV and they claimed that this might support the vascular pathology hypothesis in SSNHL etiology. By contrast with them, as supporting our results, Blaha et al. could not find a correlation between SSNHL and MPV.[13] Additionally, Karli et al. also stated that MPV is not a predictive factor in SSNHL in their study with 46 patients.[6]

If the correlation of MPV and cardiovascular diseases is assumed to be true, theoretically it could be reasonable to expect higher levels of MPV in SSNHL, as hypoxia is thought to lie behind the pathophysiology and the benefits of

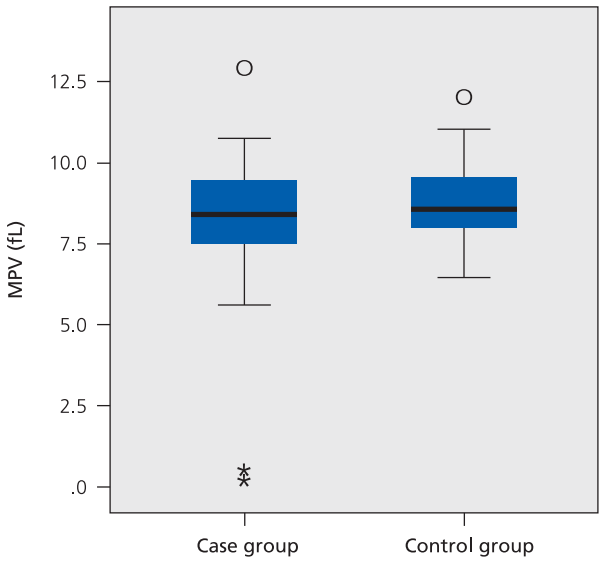

Fig. 1. Mean platelet volume (MPV) values of two groups.

hyperbaric oxygen treatment are known for it.[14] However, we could not find such a correlation in our study.

The inconsistency of the results in literature may be a result of differences in blood samples and laboratory evaluation techniques or a nonstandard measuring time. It is reported that up to 40% of difference in results is due to measuring time and different materials.[15]

The reason that we could not find any correlation between MPV and SSNHL might be our exclusion of patients having diseases like cardiovascular risk factors, smoking, hyperlipidemia, hypertension, chronic diseases which are shown to be correlated with MPV in literature. Our aim of exclusion was to show the possible correlation with idiopathic SSNHL and MPV but, in daily practice, co-morbidities are frequently observed in patients with SSNHL.[16–18] Whether we showed idiopathic SSNHL was unrelated with MPV or not, we still consider that increased MPV can be indirectly associated with SSNHL due its close correlation with the diseases that are usually coming along with SSNHL.

Conclusion

Sudden sensorineural hearing loss is still an undiscovered clinic entity. There are conflicting results on the correlation of MPV and SSNHL. Further prospective studies on larger patient populations via standardized MPV measuring techniques are needed to highlight this relation.

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Conflict of Interest: No conflicts declared.

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