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ORIGINAL ARTICLE

Investigation of neutrophil-to-lymphocyte ratio and mean platelet volume in sudden hearing loss☆,☆☆

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Abstract
Introduction: Several theories attempt to explain the pathophysiology of sudden hearing loss.
Objective: The objective of this study was to investigate the possible role of inflammation and atherothrombosis in sudden hearing loss patients through the neutrophil-to-lymphocyte ratio and mean platelet volume.
Methods: Study design – retrospective cross-sectional historical cohort. This study was conducted on two groups: one with 59 individuals diagnosed with sudden hearing loss, and other with 59 healthy individuals with the same characteristics of gender and age distribution, neutrophil-to-lymphocyte ratio and mean platelet volume levels were measured in patients diagnosed with sudden hearing loss as well as in the control group, and it was verified whether these results interfered for a better or worse prognosis with treatment of sudden deafness.
Results: Neutrophil-to-lymphocyte ratio levels are much higher in patients diagnosed with sudden hearing loss compared to the control group. Similarly, mean levels of neutrophil-to-lymphocyte ratio are higher in non-recovered versus recovered patients ($p = 0.001$). However, we could not find a correlation with mean platelet volume levels ($p > 0.05$).
Conclusion: Neutrophil-to-lymphocyte ratio is a quick and reliable indicator regarding diagnosis and prognosis of sudden hearing loss; on the other hand, mean platelet volume may be considered a less important indicator in this aspect.

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PALAVRAS-CHAVE
Perda auditiva neurossensorial;
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Linfócitos

Investigação da relação neutrófilos/linfócitos e volume médio de plaquetas na surdez súbita

Resumo
Introdução: Várias teorias tentam explicar a fisiopatologia da surdez súbita (SS).
Objetivo: : O objetivo deste estudo foi investigar o possível papel da inflamação e da aterotrombose nos pacientes de SS através da relação neutrófilos/linfócitos (RNL) e volume plaquetário médio (VPM).
Método: Forma de estudo – coorte histórica com corte transversal (retrospectivo). Este estudo foi realizado com 59 indivíduos portadores de SS e 59 saudáveis, com as mesmas características em distribuição de gênero e idade. Os níveis de VPM e RNL foram medidos nos pacientes diagnosticados com SS e no grupo controle, verificando-se se tais resultados implicavam em um melhor ou pior prognóstico com o tratamento da surdez súbita.
Resultados: Os níveis da RNL são muito mais altos em pacientes com SS, em comparação com o grupo controle. De forma semelhante, níveis médios da RNL são mais altos nos pacientes não recuperados, em comparação com os recuperados ($p = 0{,}001$). Essas diferenças entretanto, não foram observadas em relação aos níveis de VPM ($p > 0{,}05$).
Conclusão: RNL é um indicador rápido e confiável no que diz respeito ao diagnóstico e prognóstico de SS; por outro lado, VPM pode ser um indicador menos importante neste aspecto.

Introduction

Sudden hearing loss (SHL) is a disease characterized by a loss of hearing greater than 30 dB in three contiguous frequencies that occurs in less than three days.[1] The incidence of SHL ranges from 5 to 20 cases per 100,000 individuals.[2,3] Since the physiopathology of SHL is still unclear, there are many theories as to the origin of this disease, including bacterial, viral and protozoal infections, blood disorders, vascular occlusion, immune disorders, ototoxic drugs, and metabolic conditions.[3–7]

The cochlea is very susceptible to any alteration of bloodstream. Vascular diseases and platelet alterations may cause some cochlear injuries and be related to SHL.[8]

Platelets secrete and express a large number of substances that are crucial mediators of coagulation, inflammation, thrombosis, and atherosclerosis.[9] The size and functional activity of circulating platelets vary. Larger platelets are often younger, more reactive, and produce more thrombogenic factors. Mean platelet volume (MPV), which is an indicator of platelet activation, is also used as a marker of atherothrombosis,[10] and may be an important prophylactic and diagnostic tool in thrombotic and prothrombotic cases.

White blood cell (WBC) count is a useful inflammatory biomarker in clinical practice. Even if the WBC is within a normal range, subtypes of WBC, such as neutrophil-to-lymphocyte ratio (NLR), may predict cardiovascular mortality.[11,12] NLR is an easily measurable laboratory marker that is used to evaluate systemic inflammation and it has also superiority compared to other WBC subtype counts (e.g., neutrophil, lymphocyte, and total leukocyte counts). This superiority may be due to the stability of NLR compared to the other WBC subtype counts, which could be affected by various pathological and physiological conditions. As these factors can alter the individual WBC subtype counts, NLR may remain more stable. Moreover, NLR may represent both inflammatory and immune pathways that exist together in the patients. NLR has been defined as a novel and potential marker to determine inflammation in cardiac and non-cardiac disorders.[11,13–18]

Recently, the relationship between MPV and NLR with SHL were investigated individually.[15,19–21] However, to the authors' knowledge, this is the first study evaluating MPV and NLR together, and in comparison with each other, in the diagnosis and prognosis of the SHL patients. Since NLR is an indicator of inflammation and MPV indicates atherothrombosis, this study aimed to contribute to the literature by investigating the role of inflammation and atherothrombosis in SHL patients by using NLR and MPV, respectively.

Methods

This cross-sectional historical cohort study included an SHL patient group and a healthy control group. The SHL group included 59 patients who were admitted to a tertiary referral hospital ENT Clinic and were diagnosed with SHL between May of 2010 and December of 2013. Patients with history or clinical findings of any inflammatory, autoimmune, acute or chronic infectious diseases, hypertension, conductive hearing loss, angina pectoris, myocardial infarction, diabetes mellitus, metabolic syndrome, chronic obstructive pulmonary disease, amyloidosis, chronic renal insufficiency obstructive sleep apnea, current smoking, or active otologic disease were excluded, as were those who did not have a type A audiometric tympanogram. The control group included 59 age- and sex-matched healthy individuals who came to the ENT polyclinic for a required examination due to an employment application, had normal audiological findings and no active symptoms.