International Journal of Cardiovascular Research

Deficiencies in Shock and Inflammation Markers in Heart Failure Patients

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Introduction

Implantable Cardioverter Defibrillator (ICD) therapy is a widely used method of treatment that has been found to reduce mortality in NYHA class II and III heart failure patients. The most important advantage of an ICD is that it reduces mortality in high-risk patients who are experiencing sudden cardiac arrest or cardiac disease. Despite their favorable effect on mortality, inappropriate ICD shocks are one of the most dangerous side effects of the therapeutic technique. They affect between 14% and 29% of patients and account for half of all ICD-related issues. Inappropriate ICD shocks can be caused by atrial fibrillation and rapid atrial arrhythmias, sinus tachycardia, lead identification difficulties, and noise in general. The constant fear of an ICD shock lowers the patient's quality of life by causing anxiety and stress.

White blood cells and subsets, often known as leukocytes, are inflammatory markers having cardiovascular disease prognostic value. Higher neutrophil counts have been associated to a higher risk of death and poor outcomes in patients with cardiovascular disease. In recent years, researchers have discovered that the Neutrophil Lymphocyte Ratio (NLR) and Platelet Lymphocyte Ratio (PLR) are indicators of systemic inflammation and are linked to prognosis in cardiovascular diseases such as coronary artery disease, acute myocardial infarction, and heart failure, as well as malignancies and chronic inflammatory diseases. The Erythrocyte Sedimentation Rate (ESR) and C-reactive protein have also been connected to NLR and PLR.

Low Ejection Fraction (EF) patients with heart failure are more likely to develop malignant ventricular arrhythmias such as Ventricular Tachycardia (VT) and Ventricular Fibrillation (VF). ICDs can help avoid sudden cardiac death caused by certain arrhythmias. In a study involving 58 heart failure patients with ICD, higher NLR values were found to be a strong predictor of sufficient ICD shock. Although there was one study on appropriate ICD shocks in the literature, there were none on improper ICD shocks. The goal of this study was to see if there was a link between incorrect ICD shocks and markers including CRP, White Blood Cell count (WBC), Platelet Count (Tr), Neutrophil Lymphocyte Ratio (NLR), Platelet Lymphocyte Ratio (PLR), and Mean Platelet Volume (MPV) among ICD patients.

Discussion

This is the first study to look at the relationship between permissible or improper shocks and inflammatory markers in patients with heart failure who have an ICD. We identified a relationship between elevated CRP levels and the delivery of ICD shocks during this experiment. The administration of acceptable or unsuitable ICD shocks is unrelated to NLR and PLR levels, according to our findings. Heart failure is a serious disease with a high morbidity and mortality rate. Dysrhythmia, particularly ventricular tachyarrhythmia, kills more than half of heart failure patients. ICD therapy is a treatment technique that effectively avoids ventricular arrhythmias in people who have had a heart attack or who are at high risk for heart disease.

Inappropriate ICD shocks are one of the most common issues, making the treatment process difficult for patients. The most prevalent causes of erroneous ICD shocks include atrial fibrillation, supraventricular tachycardia, T-wave over sensing, lead issues, and noise. Inflammatory signs and the delivery of appropriate or incorrect ICD shocks have never been studied in the literature. According to our findings, patients who received adequate or inappropriate shock throughout the 3-year follow-up of ICD installation was older, mostly men, and had a higher incidence of hypertension and diabetes mellitus.

Neutrophils, lymphocytes, and platelets are blood cells that participate in the inflammatory process. NLR and PLR readings are low-cost and easy-to-calculate diagnostics; NLR has been proposed as a new marker for systemic inflammation. The NLR value has been found to be beneficial in predicting mortality in individuals with acute coronary syndrome, with greater NLR levels being associated with a higher risk of death. PLR is an inflammatory marker used to detect persistent inflammation, comparable to NLR. Azab et al. found that high PLR readings enhance mortality in patients who had had a myocardial infarction. In another study, PLR was found to be a better predictor of inflammation than NLR in individuals with end-stage renal failure.

Despite the fact that high WBC, PLR, and NLR values have been shown to be helpful as prognostic markers for cardiovascular disease and inflammation in the literature, we discovered that these markers are insufficient to predict whether ICD shocks are appropriate or inappropriate. High CRP levels, on the other hand, have been proven to be a better predictor of whether an ICD shock is appropriate or not, with a sensitivity of 71.6% and specificity of 89.1%.

According to studies published in the literature, inflammatory pathways may have a substantial role in the development of heart failure. Inflammatory cytokines such as CRP, interleukin-6, and TNF-have been linked to the development of heart failure in several investigations. Although there was no link between NLR, PLR, or WBC levels and shock delivery in our study, it's plausible that CRP is. This could be owing to the fact that ageing, hypertension, diabetes, and elevated CRP levels all have an arrhythmogenic effect and can lead to ICD shock delivery.