

Red cell distribution width and neutrophil-to-lymphocyte ratio predict left ventricular dysfunction in acute anterior ST-segment elevation myocardial infarction



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Objectives: Red cell distribution width (RDW) and neutrophil-to-lymphocyte ratio (NLR) are the two markers used to determine risk of mortality and adverse cardiovascular outcomes in patients with acute myocardial infarction. The relationship between RDW, NLR, and left ventricular (LV) systolic functions has not been reported. In this report, we aimed to investigate the relationship between RDW, NLR, and LV systolic function in anterior ST-segment elevation myocardial infarction (STEMI) patients who underwent primary percutaneous coronary intervention (PCI).

Methods: RDW and NLR were measured on admission in 106 STEMI patients treated with primary PCI. Patients were divided into two groups according to left ventricular ejection fraction (LVEF), as Group I (systolic dysfunction, LVEF <50%) and Group II (preserved global left ventricle systolic function, LVEF ≥50%). The first group included 47 patients and the second group included 59 patients.

Results: Mean RDW and NLR were significantly higher in Group I compared to Group II [$13.7 \pm 0.9\%$ vs. $13.4 \pm 0.7\%$, $p = 0.03$ and 5.86 (range, $0.66\text{--}40.50$) vs. 2.75 (range, $0.51\text{--}39.39$), $p = 0.013$, respectively].

Conclusion: Increased RDW and NLR on admission, in anterior STEMI patients treated with primary PCI are associated with LV systolic dysfunction.

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Keywords: Myocardial infarction, Neutrophil-to-lymphocyte ratio, Primary percutaneous coronary intervention, Red cell distribution width, Systolic dysfunction

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Introduction

Atherosclerosis is a multifactorial disease and the major cause of cardiovascular disease that still accounts for most of the mortality worldwide [1]. The role of inflammation in the development and progression of atherosclerosis has been clarified and several biological markers of inflammation predict cardiovascular risk [2,3]. Since it is an inflammatory disease, some inflammatory markers have been proposed for the evaluation of the cardiovascular risk. Red cell distribution width (RDW) and neutrophil-to-lymphocyte ratio (NLR) are the two markers of inflammation that are used to determine risk of mortality and adverse cardiovascular outcomes in patients with acute myocardial infarction (AMI) [4,5].

RDW is a laboratory measure of the variability in erythrocyte volume and is easily measured during routine complete blood counts [6]. RDW is generally used as an indicator of the differential diagnosis of anemia [5]. However, recent studies have reported that higher RDW is found to be a strong independent predictor of increased risk of mortality and adverse cardiovascular events in patients with heart failure, stable coronary artery disease, acute coronary syndrome, AMI, cardiovascular disease, and also in the general population [5,7–11].

White blood cell (WBC) count and its subtypes are also known as classic markers of inflammation in cardiovascular diseases [12]. NLR was introduced as a potential marker to determine inflammation in cardiac and noncardiac disorders, and shown as a predictor of long-term mortality in patients who underwent percutaneous coronary intervention in patients with ST-segment elevation myocardial infarction (STEMI) [13,14]. As neutrophil and lymphocyte values are readily available in routine blood count analysis, NLR may be used as a cost-effective predictor of inflammation and cardiovascular complications [4].

Left ventricular ejection fraction (LVEF) is a parameter used for assessment of left ventricular systolic function in daily practice and has been shown to be an efficacious predictor of prognosis after AMI [15]. The relationship between RDW and NLR obtained from complete blood count during first admission to hospital and left ventricular systolic functions is unknown. The goal of this study was to evaluate the relationship between RDW and NLR level on admission and left ventricular systolic functions in first anterior STEMI

Abbreviations

RDW	Red cell distribution width
NLR	Neutrophil-to-lymphocyte ratio
LV	Left ventricular
AMI	Acute myocardial infarction
WBC	White blood cell
STEMI	ST-segment elevation myocardial infarction
LVEF	Left ventricular ejection fraction
PCI	Primary percutaneous coronary intervention
LAD	Left anterior descending coronary artery
TIMI	Thrombolysis in myocardial infarction
DM	Diabetes mellitus

patients who underwent primary percutaneous coronary intervention (PCI).

Materials and methods

Patients

Medical records of consecutive patients with acute anterior STEMI who were admitted to the emergency department of our hospital between February 2008 and August 2013 were examined retrospectively. Patients <6 hours from symptom onset and who underwent primary PCI for the proximal or the mid-left anterior descending coronary artery lesions and have postinterventional thrombolysis in myocardial infarction (TIMI) III flow after primary PCI were enrolled in the study. Patients were excluded from the study if they had the following criteria: (1) a history of any heart disease including myocardial infarction, revascularization, angina pectoris, heart failure, valvular heart disease, congenital heart disease, and atrial fibrillation; (2) cardiogenic shock before the procedure, resuscitated arrest and arrest under mechanical ventilation, hemodynamically important atrioventricular block (2nd or 3rd-degree atrioventricular block), thrombolytic administration before primary PCI; or (3) clinical evidence of active infection, cancer, hematological disease, systemic inflammatory conditions, autoimmune disease, end-stage liver disease and renal failure, anemia (hemoglobin levels <13 g/dL in men and 12 g/dL in women), pregnancy, or recent blood transfusion.

Study protocol

A 12-lead electrocardiogram was recorded in each patient immediately after hospital admission. On admission, venous blood was obtained from all the patients. RDW, neutrophils, lymphocytes, and white blood cells were measured as part

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