The relationship between high red blood cell distribution width and low coronary flow reserve in patients with idiopathic dilated cardiomyopathy

Red blood cell distribution width (RDW) is a marker of circulating erythrocyte size variation (1). RDW is routinely examined as part of the complete blood cell count and is a convenient and inexpensive test (2) Besides its original role as a marker for differential diagnosis in patients with anemia, RDW is also used to assess the prognosis in patients with cardiovascular diseases such as heart failure or coronary events (3, 4).

Coronary flow reserve (CFR), which reflects coronary microvascular function, is expressed as a ratio of the coronary blood flow after maximum vasodilatation compared with the coronary blood flow at rest (5). Minimally invasive methods to assess CFR are transthoracic echocardiography, cardiac magnetic resonance imaging, and positron emission tomography. Rigo et al. (6) reported that the prognosis of patients with non-ischemic dilated cardiomyopathy (DCM) with lower CFR (≤2.0) was poorer when compared with those with normal CFR [hazard ratio, 4.0; 95% confidence interval (CI), 1.1-15.6]. Using positron emission tomography, Neglia et al. (7) assessed the relationship between CFR and survival as well as the prognosis of heart failure in patients with idiopathic left ventricular dysfunction, and they reported that low CFR was a poor prognostic factor for death and heart failure.

As mentioned above, previous studies reported the significance of CFR in patients with DCM, but the mechanism of reduced CFR in patients with DCM has not yet been clarified. Özülkü et al. (8) published in this issue conducted an observational cross-sectional study to evaluate the relationship between RDW and CFR in a group of 36 patients with idiopathic DCM and a control group of 35 healthy controls. The authors reported that a higher RDW level has a significant statistical relationship with a low CFR level (β: -0.374; $p<0.01$) as well as high-sensitivity C-reactive protein. They also reported that RDW positively correlates with serum uric acid (UA) levels. The results of this study contain new and important information that can be a clue to clarify the mechanism of low CFR in patients with idiopathic DCM.

A previous study reported the relationship between elevated serum UA levels and impaired coronary microvascular function in patients with idiopathic DCM (9). As mentioned, Özülkü et al. (8) have clarified the relationship between high RDW and low CFR. Moreover they showed that RDW positively correlated with serum UA levels as well as high-sensitivity C-reactive protein. These findings may be a clue to clarify the mechanism of low CFR in patients with idiopathic DCM. Moreover, Özülkü et al. (8) indicated that chronic inflammation and increased RDW in patients with idiopathic DCM are possibly related to coronary microcirculation or decreased left ventricular ejection fraction.

However, the cause-and-effect relationship of the results of their study cannot be verified because it was a cross-sectional study. For verification, future prospective studies should focus on survival or the prognosis of heart failure in patients with idiopathic DCM who have higher RDW and low CFR.

Whereas the above mentioned study used single and cross-sectional RDW, several recent studies have used sequential changes in RDW obtained by repeated measurements to assess the relationship between RDW and the prognosis of heart failure. For example, Cauthen et al. (10) reported that a progressive rise in RDW was related to worsening chronic heart failure. They evaluated 6,159 consecutive ambulatory patients with chronic heart failure and assessed changes in RDW values from baseline to 1-year follow-up. They found that for each +1% increment in baseline RDW value, the risk ratio for all-cause mortality was 1.17 (95% CI, 1.15-1.19). Makhoul et al. (11) evaluated 614 patients with acute decompensated heart failure and reported that the change in RDW was related to the prognosis of this condition, and they showed that changes in RDW during hospitalization were strongly associated with changes in mortality risk. The results of these studies highlight the clinical importance of sequential changes in RDW in addition to RDW values obtained from a single measurement.

In conclusion, the results of study by Özülkü et al. (8) are very important as a clue to the mechanism of low CFR in patients with idiopathic DCM. However, theirs was a cross-sectional study, and prospective studies focusing on the assessment of survival or the prognosis of heart failure in patients with idiopathic DCM should be conducted to verify the results. In addition, to clarify the pathophysiology, it is especially important to assess the survival and the prognosis of heart failure using single and cross-sectional RDW as well as sequential changes in RDW obtained by repeated measurements.

Yuji Nishizaki, Hiroyuki Daida*,

Department of Cardiology, Juntendo Tokyo Koto Geriatric Medical Center and *Department of Cardiology, Juntendo University Graduate School of Medicine; Tokyo-*Japan*

Address for Correspondence: Dr. Yuji Nishizaki, MD, PhD, MPH, Department of Cardiology, Juntendo University Graduate School of Medicine, Juntendo Tokyo Koto Geriatric Medical Center, Shinsuna 3-3-20, Koto-Ku, 136-0075, Tokyo-*Japan*
Phone: +81-3-5632-3111 Fax: +81-3-5632-3728 E-mail: ynishiza@juntendo.ac.jp

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