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An Increase in Mean Platelet Volume/Platelet Count Ratio Is Associated with Vascular Access Failure in Hemodialysis Patients

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Background: After stenosis in hemodialysis arteriovenous (AV) vascular access, platelets play a crucial role in the subsequent thrombus formation, leading to access failure in hemodialysis patients. In a previous study, the mean platelet volume (MPV)/platelet count ratio, but not MPV alone, was shown to be an independent predictor of 4-year mortality after myocardial infarction. However, little is known about the potential influence of MPV/platelet count ratio on vascular access patency in hemodialysis patients.

Methods: One hundred and forty three patients performing with routine hemodialysis were recruited between January 2013 and February 2016. The vascular access failure (VAF) was defined as thrombosis caused by stenosis having received thrombectomy or greater than 50% stenosis shown on angiography requiring either surgical revision or percutaneous trasluminal angioplasty. Platelet indices, including MPV/platelet count ratio and its changes were compared between patients with VAF and without VAF by linear mixed model analysis. Additionally, Cox proportional hazards model analysis ascertained that the change of MPV/platelet count ratio between baseline and 3months (ΔMPV/platelet$_{3mo-baseline}$) was prognostic value for VAF.

Results: Among the 143 patients, 38 (26.6%) patients were diagnosed with VAF. During the mean follow-up of 24.6 ± 11.4 months, ΔMPV/platelet$_{3mo-baseline}$ was significantly increased in the patients with VAF compared to patients without VAF (10.0 ± 11.5 vs. 5.4 ± 9.7 femtoliter/million; $P < 0.01$). Moreover, a liner mixed model revealed that there was a significant difference in the increase of MPV/platelet count ratio over time between patients with VAF and without VAF. In multivariate analysis, ΔMPV/platelet$_{3mo-baseline}$ was an independent predictor of VAF, after adjusting for age, sex, diabetic mellitus, serum calcium,

serum phosphate, serum parathyroid hormone, and vascular access type (hazard ratio, 1.05; 95% CI, 1.02 – 1.08; P < 0.001).

Conclusion: An increase in MPV/platelet count ratio is an independent risk factor for VAF. Therefore, continuous monitoring of MPV/platelet count ratio may be useful to stratify the risk of VAF in patients performing with routine hemodialysis.

Keywords: Vascular access, arteriovenous fistula, maturation