The Efficacy of Percentage of Immature Platelet Fraction (IPF) and Platelet Indices for Distinguishing between Destructive and Underproduction Thrombocytopenia

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Background: Thrombocytopenia is a common problem in general practice, mainly either from underproduction of bone marrow or over-destruction of platelet. Nowadays, there are many tools to predict the etiology of thrombocytopenia without performing bone marrow examination; for example, percent of reticulate platelet (RP), mean platelet volume (MPV), platelet distribution width (PDW), and platelet large cell ratio (PLCR). However, those tools have their own limitations in predicting the cause of thrombocytopenia.

Objective: The primary objective was to explore the sensitivity and specificity of percentage of immature platelet fraction (IPF), including an appropriate cut-off value of IPF for distinguishing the cause of thrombocytopenia between underproduction and over-destruction. To validate the cut-off value, another cohort of patients with thrombocytopenia was tested. The secondary objective was to compare the sensitivity and specificity of other platelet indices, including MPV, PDW, and PLCR with IPF in determining the cause of thrombocytopenia.

Methods: We conducted a cross-sectional study enrolling patients with platelet count of less than 100 x 10^9/L into the training set. All of them were diagnosed the cause of thrombocytopenia by hematologists. The receiver operating characteristics curve was used to find the cut-off value of IPF. To validate the cut-off value, another set of patients was tested. Area under the curve (AUC), sensitivity and specificity of the cut-off value of IPF were compared to those of MPV, PDW, and PLCR.

Results: For training set, there were 98 patients. Half of them (n=49) were diagnosed with underproductive caused by bone marrow examination. The other half had over-destructive causes. The appropriate cut-off value of IPF was 5.75%, given 81% sensitivity and 76% specificity with AUC of 0.83 (95%CI 0.76-0.92), while the cut-off value of MPV (10.85 fl), PDW (13.0 %) and PLCR (32.4%) had lower AUC (MPV: 0.75, PDW:0.73, PLCR: 0.75) sensitivity (MPV: 82%, PDW:84%, PLCR: 80%) and specificity (MPV: 56%, PDW: 58%, PLCR: 46%) than those of IPF for detection of over-destructive thrombocytopenia. IPF could correctly distinguish the cause of thrombocytopenia in 75% of patients in the validation cohort.

Conclusion: IPF is a useful non-invasive screening test. A cut-off values of %IPF at more than or equal to 5.75 had a high sensitivity and specificity for categorizing over-destructive thrombocytopenia.

Keywords: IPF, Thrombocytopenia, Sensitivity