論 文 要 旨

A modified microchip-based flow chamber system for evaluating thrombogenicity in patients with thrombocytopenia

Bengo Atari

【Background】

In the intensive care unit (ICU), patients with thrombocytopenia are at high risk for bleeding and should be assessed for their thrombogenic potential. However, the analytical conditions of conventional hemostatic tests are unsuitable for the evaluation of low-platelet samples. Here we aimed to establish suitable analytical conditions with the Total Thrombus-formation Analysis System (T-TAS) for quantitative assessment of thrombogenic potential in patients with thrombocytopenia and to investigate how T-TAS values relate to bleeding symptoms and the effects of platelet transfusion.

【Methods】

Modified chips with a different chamber depth were developed for the analysis of low-platelet samples in the T-TAS. We included 10 adult patients admitted to the ICU of Kagoshima University Hospital who required platelet transfusion. Patients were divided into major and minor bleeding groups according to their bleeding scale before platelet transfusion. The thrombogenic potential of these patients before and after platelet transfusion was assessed with hemostatic function tests, including rotational thromboelastometry, multiplate aggregometry, and the T-TAS.

【Results】

Analysis of low-platelet samples revealed that, compared with the conventional chip (80-μm-deep chamber), the modified chip (50-μm-deep chamber) achieved higher sensitivity in detecting elevation of flow pressure caused by growth of an occlusive thrombus in the T-TAS analytical chamber. All patients in the minor bleeding group retained thrombogenic potential that occluded the modified chip (occlusion time 16.3 ± 3.3 min), whereas most patients in the major bleeding group were unable to occlude the modified chip during the 30-min measurement ($P < 0.01$). The recovery of thrombogenic potential after platelet transfusion was confirmed with the T-TAS and correlated with the function, rather than the count, of transfused platelets. Among all evaluated parameters in hemostatic function tests, only the T-TAS showed significant differences in occlusion time and area under the curve both between the minor and major bleeding groups and between pre- and post-platelet transfusion.

【Conclusions】

We developed a modified microchip-based flow chamber system that reflects the hemostatic function of patients with thrombocytopenia.