Role of Hypercoagulation Detected by Rotational Thromboelastometry in Prediction of Free Flap Thrombosis in Patients Undergoing Microvascular Surgery

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II

Introduction. Free tissue transfer surgery is associated with risk of postoperative flap microvascular thrombosis reaching 4%–6%. Nowadays, rotational thromboelastometry (ROTEM®) method has been shown as an effective tool for providing targeted bleeding management with restrictive blood transfusion strategy in hemorrhagic patients. Besides, ROTEM notably reflects hypercoagulation, as shown in quantitative and qualitative data analyses. At the same time there is limited information available about any prognostic value of hypercoagulation status detected by ROTEM for postoperative free flap thrombosis.

Aim, Material and Methods. The aim of the study was to evaluate the predictive capacity of hypercoagulation detected by ROTEM for free flap failure in patients undergoing microvascular surgery. In the prospective observational study were enrolled 51 patients, who underwent microvascular free flap surgery in the Latvian Centre of Reconstructive and Microsurgery. Demographical data and external thrombogenic factors such as comorbidities, previous thrombosis, history of trauma and smoking were recorded. Preoperatively, rotational thromboelastometry (ROTEM®) and coagulation tests APTT, prothrombin ratio, fibrinogen, platelets were performed.

Results. 51 patients with mean age 39 ± 13 years undergoing free flap surgery between 2013 and 2015 were enrolled in the study. Two groups of patients, with or without hypercoagulation detected by ROTEM fibrinogen/platelet ratio (FPR), were compared. Hypercoagulation was seen in 15 patients ((FPR) ≥ 42). The main reason (in 67%) for hypercoagulative state was recent (less than 1 month) trauma. In comparative analysis patients with preoperative hypercoagulation had significantly higher values of following ROTEM parameters: MCFEXTEM ($p < 0.001$), MCFINTEM ($p < 0.001$), MCF FIBTEM ($p < 0.001$), and significantly lower values of following ROTEM parameters: CFTEXTEM ($p = 0.01$), CFTINTEM ($p = 0.02$). Additionally, incidence of free flap thrombosis was significantly higher for patients with hypercoagulability detected by ROTEM compared to the group without hypercoagulation, 5/15 (33%) vs. 4/36 (11%), $p = 0.047$. The area under the curve (AUC) for hypercoagulation detected by ROTEM to predict free flap thrombosis was 0.7 ($p = 0.05$). The highest correlation was revealed between MCFINTEM and incidence of free flap thrombosis, $r = 0.3$; $p = 0.04$.

Conclusions. Rotational thromboelastometry is a suitable method to detect hypercoagulability preoperatively with definite predictive capacity for postoperative free flap thrombosis in microvascular surgery. Routine usage of ROTEM test can early identify patients in high risk for transferred tissue failure.