

## Hypercoagulation and Free Flap Thrombosis Risk in Reconstructive Microvascular Surgery Patients

Jevgenijs Stepanovs<sup>1</sup>, Agnese Ozolina<sup>1</sup>, Indulis Vanags<sup>1</sup>,  
Liene Nikitina-Zake<sup>2</sup>, Biruta Mamaja<sup>1</sup>

<sup>1</sup>Rīga Stradiņš University, Department of Anaesthesiology and Intensive Care, Latvia

<sup>2</sup>Latvian Biomedical Research and Study Centre

**Introduction.** Hypercoagulability in microsurgical reconstruction patients can pose a significant problem. Despite progress in free flap transfer surgery, microvascular thrombosis remains a serious threat.

**Aim, Materials and Methods.** This study aims to assess the prognostic value of hypercoagulation detected preoperatively by rotational thromboelastometry (RTE) regarding flap thrombosis rate in reconstructive microsurgery.

In the prospective observational study 76 patients were enrolled, who underwent microvascular free flap surgery due to traumatic tissue injury in the Latvian Centre of Reconstructive and Microsurgery.

Preoperatively external thrombogenic factors and RTE data were registered. Two groups of patients: with and without hypercoagulation detected by fibrinogen/platelet ratio (FPR)  $\geq 42$  were compared. Association between external thrombogenic factors, hypercoagulability in RTE and surgical outcome (free flap thrombosis) was analysed.

**Results.** From all patients, external thrombogenic factors were identified: recent (< 1 month) trauma in 27/76 patients (35%), chronic osteomyelitis in 14/76 (18%), thrombogenic comorbidities in 17/76 (22%). Hypercoagulability by RTE was found in 21 (30%) patients, confirming by CFTEXTM ( $p < 0.001$ ), MCFEXTEM ( $p < 0.001$ ), CFTINTEM ( $p < 0.001$ ), MCFINTEM ( $p < 0.001$ ), MCFFIBTEM ( $p < 0.001$ ). Demographical and surgical data were similar in both groups. Patients in group with hypercoagulability had significantly lower haemoglobin level (11 vs. 13.5;  $p < 0.001$ ), higher fibrinogen level (4.98 vs. 3.49;  $p < 0.001$ ), and platelet count (434 vs. 274;  $p < 0.001$ ). Recent trauma was found to be a significant factor for hypercoagulability: there were significantly more patients with recent trauma in hypercoagulation group 15/21 (71%) vs. 12/55 (27%)  $p < 0.001$ . Chronic osteomyelitis demonstrated hypercoagulation tendency in RTE data without FPR changes.

Incidence of free flap thrombosis was higher in RTE hypercoagulability group, 6/21 (28%) vs. 7/55 (12%),  $p = 0.101$ . In recent trauma patients, thrombosis developed only in hypercoagulation group, 4/15 (26.7%) vs. no thrombosis in non hypercoagulation group ( $p = 0.053$ ). RTE hypercoagulative data demonstrated a strong trend to predict higher flap thrombosis possibility in patients with recent trauma.

**Conclusions.** Rotational thromboelastometry data seem to allow early identification of higher risk of transferred tissue failure in patients with recent trauma. Hypercoagulation detected preoperatively by rotational thromboelastometry can influence postoperative free flap thrombosis rate.