SEARCHING FOR THE RIGHT TIMING OF SURGICAL DELAY: ANGIOGENESIS, VASCULAR ENDOTHELIAL GROWTH FACTOR AND PERFUSION CHANGES IN A SKIN-FLAP MODEL.

BACKGROUND: The angiogenic potential of vascular endothelial growth factor (VEGF) and its oxygen pressure-dependent regulation suggest a strong connection between this growth factor and the ‘delay phenomenon’. In this study we focused on the chronological changes in VEGF concentration and flap perfusion in order to optimise the duration of surgical delay. METHODS: The VEGF concentration in skin and underlying muscle was measured in oversized, random-pattern flaps on 38 male Sprague-Dawley rats after 3, 5 or 7 days of surgical delay. Additionally, flaps were raised 5 or 7 days past preconditioning. The effect on flap perfusion was measured using indocyanine green fluoroscopy and the size of surviving and necrotic areas of the flaps were analysed. Microvessel density was assessed using a monoclonal CD31 antibody, and vessel diameter and morphometry were appraised by means of corrosion casting. RESULTS: VEGF expression in the distal half of the flaps was significantly increased 3 days after preconditioning and perfusion was significantly enhanced after day 5. An interval of 5 days between preconditioning and flap transposition resulted in a significantly reduced average necrosis rate. Microvessel density was significantly increased and vessel diameters were enlarged (P<0.05). CONCLUSIONS: We
illustrated the chronology of events from the ischaemic procedure to the rise in VEGF concentration and changes in flap perfusion, and demonstrated vasodilatation and the formation of new vessels. Most significantly, we were able to further specify the optimal length of surgical delay based on alterations on a molecular level as well as changes in vascularisation and perfusion.

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