Laser-doppler-flowmetry and absorption-tissue-spectrometry of the transposed groin flap - A comprehensive and independent analysis of microcirculation

K. Wolf[l], E. Höcherl[1], T. Derfuß[2], A. Krug[2]

[1]Department of Trauma, Hand and Reconstructive Surgery, Hospital Munich Schwabing, Teaching Hospital of Ludwig-Maximilians- University Munich, Germany; [2]LEA Medizintechnik GmbH, Gießen, Germany

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Abstract

Our actual surgical experience with the transposed groin flap provides valid proof that an autonomous blood circulation is derived from the recipient site before disconnection of the pedicle of the flap. The tangible benefits obtained from the use of Laser-Doppler-Flowmetry (LDF) and the Absorption-Tissue-Spectrometry (ATS) were apparent during two operations as outlined in this report. Case reports have been published which claim that an autonomous blood supply from the recipient site failed to appear. We think, therefore, that the autonomy of blood vessels, from the groin flap pedicle, can safely be excluded so that surgeons can determine the exact point in time for a disconnection of the groin flap when using guidelines from numerical values. Standardized procedures and rules need to be established for the application of LDF and ATS as we are convinced that these systems can be the basis for training broad groups of potential users worldwide. These methods have been used on two patients and we documented the preoperative conditions of the pedicle disconnections. The LDF system represents a physiological term which is synonymous with "microcirculation". The numerical values represent the conditions of the existing blood volume in the capillaries as well as the velocity of blood particles which float throughout the vessel system. The ATS system measures the oxygen (O_2) saturation of the hemoglobin in the analysed tissue volume as well as in the local concentration. While studying the groin flap transposition to the upper extremity of the injured hand we made a comparison with the contralateral hand as well as with the contralateral groin region. On the day prior to the operative separation we analysed the clamping of the pedicle during a two hour period. We were faced with specific demands which were strictly followed prior to the operative disconnection of the pedicle of the flap. We recognised the importance that there be a continuous flow of blood in the flap without any decrease of counts after the clamping procedure ends. lie tolerable decrease of oxygen saturation of the hemoglobin measured slightly below 25 % of the starting value. We realized that for this procedure to be successful the hemoglobin concentration should not decrease once the clamping procedure begins and that this procedure requires an interface with granulation tissue. After a period of three weeks we discovered that the transposed groin flap matched the tissue proportionality of the upper extremities. The LDF and the ATS systems are excellent methods which have helped us to resolve the question of how to monitor a sufficient blood supply flowing out of the recipient site. Having utilized these methods we have proven that the retrograde blood supply after clamping of the flap pedicle from the upper extremity is measurable. Also by using the channel system of the flexible Laser Doppler Opto Flow it was possible for us to obtain a full spectrum of safety. These results confirmed and reinforced our decision to proceed with the pedicle disconnection.