

Danish Microsurgical Society, Hindsgavl Congress, 21-22 March 2002, Micro-circulation and Postoperative Monitoring after free flap surgery and replantation
Focusing on ischemia/reperfusion, preconditioning and monitoring technology

Title: Non-invasive Oxygen and Perfusion Monitoring

Referent: Dr. rer.hum.biol. Dipl.Ing. Krug, Alfons
LEA Medizintechnik, Winchesterstr. 2, 35394 Gießen, Germany
www.LEA.de, Krug@LEA.de,

Abstract

Although the success rate of flap transplants increased to 91-99%¹ in the last thirty years since their introduction due to advancement of microsurgical methods, the loss of transplanted tissue is associated with such high costs, effort and strain for the patient, that the fight for each single transplant is tremendously important and beneficial². Most important is the early diagnosis of perfusion impairments (because of arterial and venous occlusion) caused by thromboses that are the main reasons for loss of flaps. With early enough diagnosis most flaps can be revised. Over the last years the laser Doppler has proven to be a reliable, non invasive, continuous, exact and simply applicable diagnostic device to identify undersupply earlier than it can be identified by experienced staff. The preservation of vulnerable transplants could be increased to 50-100%³. However, for the judgment of viability of tissue it is not only necessary to observe the delivery of blood, but also the metabolic conditions of the tissue. Furthermore it would be very helpful to be able to determine whether the perfusion impairment is due to an arterial occlusion or due to a venous occlusion. The monitoring of capillary oxygen saturation, hemoglobin volume in the capillaries and blood perfusion can be recorded simultaneously by a new device called O2C (abbreviation for "Oxygen to see"). So the monitoring of perfusion and metabolic utilization is made possible and an arterial occlusion can be distinguished from a venous occlusion. First results from various organs are presented, especially from transplants such as a transplanted flap from the forearm being shifted to the heel⁴, or a breast reconstruction by a TRAM flap⁵ and finally a hand reconstruction. At the hand reconstruction⁶ the monitoring potential could be shown, because there the anoxic conditioning of the flap for stimulation of angiogenesis allows a tight therapy control.

1) Jones, N.F. Intraoperative and postoperative monitoring of microsurgical free tissue transfer. *Clin.Plast.Surg.* 19:783, 1992

2) Yuen, J.C. and Feng, Z. Reduced cost of extremity free flap monitoring. *Ann. Plast. Surg.* 41:36, 1998

3) Yuen, J.C. and Feng, Z. Monitoring free flaps using the laser Doppler flowmeter: five-year experience. *Plast. Reconstr. Surg.* 105:55, 2000

We would like to thank our clinical partners, where the studies had been carried out and allowed us to present this first results.

4) Prof. Jostkleigrewe, BGU Duisburg, Abt. für Handchirurgie, Plastische Chirurgie und Brandverletzte.

5) Dr. Nestle-Krämling, Heinrich-Heine-Universität Düsseldorf, Frauenklinik

6) Prof. Lanz, Klinik für Handchirurgie, Bad Neustadt (Saale)