S25: Clinical Microcirculation

S25-1 Postoperative control of vascularized lymph node transfer (VLNT) for the treatment of extremity lymphedema: Ultrasound guided lymph node monitoring using contrast enhanced ultrasound (CEUS)

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Background and objectives:
Most plastic surgeons have been facing lymphedema as a clinical challenge over past few years. However, lymphatic surgery using new technical innovations such as micro and super microsurgery techniques is a rapidly advancing field to manage fractious cases.
Vascularized lymph node transfer for treatment of lymphedema is a promising operative technique showing beneficial results in early but also in advanced lymphedema stages.
To evaluate the lymph node perfusion in various cases, postoperative lymph node monitoring with Contrast-enhanced Ultrasound (CEUS) could be considered superior properties.
In this paper, the role for vascularized lymph node flaps positioned at the subcutaneous level in lymphedema patients were evaluated.
METHODS:
Ten patients has undergone vascularized lymph node transplantation from 2016 to 2017.By using CEUS, postoperative lymph node vitality and blood flow were evaluated. Lymph node perfusion was assessed by an experienced senior radiologist using linear probes (6-9, 6-15MHz) and bolus injections of Sulphur-hexafluoride microbubbles. Measurements were recorded for TTP (time to peak) and AUC (Area under curve) by using the time intensity curve (TIC) analysis.
RESULTS:
All vascular lymph node flaps were successful and showed no major complications. CEUS proved lymph node vitality and blood flow in a minimally-invasive and propagative manner.
CONCLUSIONS:
Contrast-enhanced Ultrasound (CEUS) can perform superiorly the postoperative monitoring of vascularized lymph node flaps positioned at a subcutaneous level in a quick, propagative and safe fashion.

S25-2 The Use of Indocyanine green (ICG) imaging technique in the groin lymphocele microsurgical resection

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The postoperative occurrence of lymph fistulas and lymphoceles in the groin is a complication that should be taken seriously. These fistulas or lymphocele cause an increase in morbidity and can support local and ascending infections. Furthermore a conservative treatment is not

always successful. We recently described the Microsurgical resection of peripheral lymphoceles.
In the following study we investigated the efficacy of a pre-operativ and intraoperativ diagnostic and therapeutic protocol to manage inguinal lymphoceles using lndocyaningreen (ICG) and microsurgical procedures. All fiveteen patients completely recovered without the need of any compression garment, after the surgery.

S25-3 Significance of high-resolution Color-Duplex-Ultrasound (CDU) designing adipocutaneous, fasciocutaneous and chimeric perforator flaps

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Background: Perforator flaps have become a popular solution for reconstructive tissue transfer. The "hot/cold zone" allows rapid dissection and thin flap harvest at the same time. However, a dependable preoperative perforator mapping is compulsory. Identifying perforating vessels, Color Duplex ultrasonography (CDU) has demonstrated to have the highest pooled sensitivity and positive predictive value in literature. The following study presents the technology addressing advantages as well as limitations of ultrasound-guides flap design.
Methods: Experiences with sonography-guided flap design gained from 80 perforator flap free tissue transfers performed at the department of plastic, hand and reconstructive surgery, University of Regensburg without using any other technology, was the basis of our study. Our standardized approach includes regular markings, patient positioning, and easy ergonomics. CDU device settings, program selection, and conventional maneuvering of probe are outlined. Scanning directions through thigh tissues and identification of micro vessels in color duplex mode are outlined.
Results: Multifrequency 6-15 MHz linear transducers were utilized for micro vessel localization. Recommendable device settings are depth focused to 3-5 cm, sufficient color gain, wall filter (WF) low and a pulse repetition frequency (PRF) at 0.5-20 Mhz. A 100% correlation rate was found comparing CDU-guided pre-operative micro vessel mapping with surgical exploration of perforators. Perforator mapping with CDU was easy to learn for microsurgeons. It proved to be highly accurate, inexpensive and convenient. Respective video and picture material is demonstrated. Conclusion: Color Duplex ultrasonography (CDU) is a powerful instrument for preoperative perforator mapping in reconstructive surgery using perforator flaps.

S24-4 Influence of systemic vasopressor drugs and fluid administration on microcirculation in free tissue transfer[1]

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Background: Perioperatively, patients' hemodynamics are modulated predominantly by intravenous fluid administration and vasoactive pharmacological support. Vasopressor agents are suspected to be detrimental on free flap survival by the cause of vasoconstriction of the pedicle with consecutive reduced overall flap perfusion and by aggravation of flap dissection.
Objective: A novel, standardized fluid restrictive perioperative hemodynamic management was assessed for its feasibility in clinical practice in free flap patients undergoing breast reconstruction.
Methods: Patients were randomized to two perioperative regimens with different fluid and vasopressor limits. The primary endpoint regarded flap survival. Secondary endpoints included surgery times, time of patient ambulation and length of hospital stay.
Results: There was one total flap failure with liberal fluid administration (LFA). No total or partial flap failure was noted in the fluid restrictive regime with norepinephrine administration up to 0.04 µg/kg/min (FRV). No delay regarding operation time (p=0.217), patient mobilization (p=0.550) or hospital discharge (p=0.662) was registered in the FRV study subpopulation compared to LFA.
Conclusions: The results of this prospective interventional trial could not detect any negative impact of vasopressors, neither for the primary endpoint of flap survival nor for the overall patient outcome. The fear of vasopressor associated flap complications has led to a traditional liberal fluid administration, which failed to demonstrate any benefits when compared to a fluid restrictive vasopressor strategy.
Keywords: deep inferior epigastric perforator (DIEP) flap, free flap, breast reconstruction, vasopressors, norepinephrine
[1]*Anker AM, Prantl L, Strauss C, et al. Vasopressor support vs. liberal fluid administration in deep inferior epigastric perforator (DIEP) free flap breast reconstruction - a randomized controlled trial. Clin Hemorheol Microcirc 2018: 69: 37-44.*

S25-5 ICG-fluorescence-angiography– a new indication in revascularized digits and toes

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Background: Intra- and postoperative assessment of flap perfusion with near-infrared fluorescence imaging is frequently used among plastic surgeons. As clinical evaluation of perfusion in revascularized digits can be difficult, near-infrared fluorescence may offer a new evaluation tool.
Objective: As microsurgical anastomosis can be monitored with near-infrared fluorescence imaging there is potential concerning revascularized digits and toes with soft tissue depths not exceeding 7mm above anastomosis. In a case of a severe crush injury of the hand and in a case of two reattached toes more information about the perfusion was necessary as clinical assessment suspected loss of perfusion.
Methods: After intravenous application of ICG the near-infrared imaging showed a delayed but sufficient perfusion in both cases so that a salvage surgery was not necessary.
Conclusion: In scenarios of critical perfusion in revascularized fingers and hands, the perfusion control via application of ICG and near-infrared fluorescence imaging can be a helpful tool.

S25-6 ICG-fluorescence-angiography in revascularized digits – first results of a standarized clinical study

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Background: Intra- and postoperative assessment of perfusion with near-infrared fluorescence imaging is commonly used among plastic surgeons to evaluate the quality of a microsurgical anastomosis in free flaps. As microsurgical anastomosis can be monitored there is also potential concerning revascularized fingers and hands.
Objective: A novel standardized study evaluating the perfusion of revascularized digits with near-infrared fluorescence imaging was assessed for its reliance compared to clinical assessment and predictive value.
Methods: The primary endpoint regarded the survival of revascularized digits. Secondary endpoints included the need of salvage surgery, follow-up surgeries and evaluation of DASH-score.
Conclusion: Preliminary results suggest that fluorescence imaging with indocyanine green is a reliable and helpful tool to evaluate the perfusion of revascularized digits. The detection of critical perfusion seems to be even more accurate than clinical evaluation.