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### Reverse Maneuver Lymphatic Drainage for Vascularized Lymph Node Transfer to Distal Recipient Site for Extremity Lymphedema

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**Background:** In a clinical study we investigated Vascularized Lymph Node Transfer (VLNT) for lymphedema and consecutive postoperative rehabilitation with regards to the mechanism of pump and drainage effects of VLNT to distal recipient sites.

**Methods:** We describe a new rehabilitation protocol after VLNT, massaging the limb towards VLNT recipient site. The outcome was measured by circumferential reduction rate and lymph quality of life. Additionally, we performed a systematic review of published clinical studies and case reports to summarize outcomes regarding recipient sites.

**Results:** At Chang Gung Memorial University Hospital, from 2013 to 2016 a total of 138 patients with lymphedema of limbs were evaluated. 70 patients (50.7%) received VLNT and reverse maneuver lymph drainage (VLNT-group). 68 patients (49.3%) were assigned to physical therapy only (CDT-group). Follow-up was  $23.1 \pm 8.5$  months in the CDT-group and  $36.4 \pm 4.4$  months in the VLNT-group. The mean circumferential reduction rate reached  $12.2 \pm 8.6\%$  in the CDT-group, and  $38.3 \pm 7.5\%$  in the VLNT-group. Mean overall-QOL-score improved from  $4.7 \pm 0.9$  prior to treatment to  $5.1 \pm 1.7$  in the CDT-group, and from  $3.8 \pm 0.3$  to  $7.4 \pm 1.4$  in the VLNT-group. In the systematic review we analyzed 21 papers, published between 2006 and 2018. In total 378 patients were treated with 387 VLNTs. Papers were divided in three groups according to recipient site: Reduction rate was documented in 2 of 10 papers in group A (proximal recipient site), representing a mean reduction rate of 24.8%, and in 7 of 10 papers in group B (distal recipient site), representing a mean reduction rate of 36.1%, respectively.

**Conclusions:** Postoperative rehabilitation measures are different from standardized complex decongestive therapy and have to provide for the underlying hypotheses of VLNT to the distal recipient site. In our hands, distal VLNT in combination with reverse maneuver lymph drainage significantly improves lymphedema.