Pre-Planning Vascularized Lymph Node Transfer with Duplex Ultrasonography: A Prospective Evaluation of Three Common Donor Sites

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Introduction

Vascularized lymph node (VLN) transfer is becoming increasingly utilized in the treatment of symptomatic extremity lymphedema. As experience has grown, new VLN sources have become apparent. Descriptive studies have elucidated variable lymph node presence, advantages, disadvantages, and flap characteristics from these donor basins. Yet, no study has critically evaluated the pre-operative imaging evaluation between donor sites in patients undergoing VLN transfer. Therefore, the aim of this study was to compare the findings on duplex ultrasonography (U/S) of three common VLN donor sites, submental, groin, and transverse cervical artery (TCA) lymph node flaps in patients undergoing VLN transfer.

Methods

An IRB-approved prospective evaluation was performed for patients planning to undergo VLN transfer. Each patient had preoperative duplex U/S in order to provide objective data regarding flap characteristics for the groin, submental, and TCA VLN flaps. Statistical analysis was used to define variations within each patient. An *a priori* value of 0.05 was considered statistically significant.

Results

Sixty-eight patients were prospectively enrolled and met the inclusion criteria. Average age and BMI were 56.1 years and 27.3 kg/m^2, respectively. Presenting complaint was lower limb lymphedema in a majority of patients (59%) as compared to upper extremity lymphedema. When comparing VLN donor sites, larger average arterial diameter was seen with the groin flap (5.2mm) as compared to the submental (1.6mm) and TCA flaps (2.1mm; $p<0.05$). Lymph node quantity and density was found to be highest with the submental flaps and groin flaps as compared to the TCA flap. An average of 3.1 nodes were found in both the submental and groin flaps as compared to 0.9 nodes found in the TCA flap ($p<0.05$). In addition, when calculating flap volumes, the density of nodes was highest in the groin and submental flaps in comparison to the TCA flap ($p<0.05$).

Conclusions

Preoperative imaging with duplex U/S prior to VLN transfer allows for accurate identification of donor site lymph node basins and flap characteristics. With each VLN flap option, advantages and disadvantages exist and must be taken into consideration for each individual patient. When considering lymph node density, submental and groin VLN flaps appear to have favorable characteristics.