

# Outcomes of Lymphedema Microsurgery for Breast Cancer-related Lymphedema With or Without Microvascular Breast Reconstruction

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**Objective:** This study investigated the outcome of lymphedema microsurgery with or without microsurgical breast reconstruction for breast cancer-related lymphedema (BCRL).

**Background:** Complete decongestive therapy, lymphovenous anastomosis, and vascularized lymph node flap transfer are the 3 major treatment modalities for BCRL. Releasing axillary contracture and transferring a free flap may potentially improve the BCRL.

**Methods:** Between 2004 and 2015, 124 patients with BCRL who underwent 3 treatment modalities without or with microsurgical breast reconstruction were included in this study as groups I and II, respectively. Patients were offered the lymphedema microsurgery depending on the availability of patent lymphatic ducts on indocyanine green lymphography if they failed to complete decongestive therapy. The circumferential difference, reduction rate, and episodes of cellulitis were used to evaluate the outcome of treatments.

**Results:** Improvements in the circumferential difference ( $12.8 \pm 4.2\%$  vs  $11.5 \pm 5.3\%$ ), the reduction rate ( $20.4 \pm 5.1\%$  vs  $14.7 \pm 6\%$ ), and episodes of cellulitis ( $1.7 \pm 1.1$  vs  $2.1 \pm 2.4$  times/yr) did not significantly differ between groups I and II ( $P = 0.06, 0.07,$  and  $0.06$ , respectively). In both groups, vascularized lymph node flap transfer was significantly superior to lymphovenous anastomosis or complete decongestive therapy in terms of improvements in the circumferential difference, reduction rate and episodes of cellulitis ( $P = 0.04, 0.04,$  and  $0.06$ , respectively).

**Conclusions:** Microsurgical breast reconstruction did not improve the outcome of BCRL. Improvements in BCRL were better for lymphatic microsurgery than complete decongestive therapy. Moreover, vascularized lymph node flap transfer provided greater improvements in the BCRL than lymphovenous anastomosis.

**Keywords:** breast cancer-related lymphedema, lymphatic surgery, lymphovenous anastomosis, vascularized lymph node flap transfer

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**B**reast cancer-related lymphedema (BCRL) of the upper extremity is a progressive and debilitating sequela with an incidence of 10% to 50% among patients with breast cancer.<sup>1–5</sup> Lymphedema has been reported to develop within days and up to 30 years after breast cancer treatment,<sup>2</sup> and radiotherapy and axillary lymph node dissection are major risk factors for this condition. Moreover, the number of removed lymph nodes has also been found to be a significant risk factor for BCRL.<sup>1</sup>

The release of axillary contracture may potentially improve BCRL, especially when accompanied by the transfer of a soft-tissue flap, that is, a free deep inferior epigastric perforator flap or a pedicled latissimus dorsi flap to the axilla.<sup>6–9</sup> However, the ability of microsurgical breast reconstruction with a free deep inferior epigastric perforator flap to improve BCRL has been debated.<sup>4,10–13</sup>

Several papers showed that microsurgical breast reconstruction decreased the incidence of BCRL, which may have been due to patient selection.<sup>10–13</sup> Conversely, Zhu et al<sup>3</sup> indicated that the reconstructive method did not appear to affect the incidence or onset of BCRL. Nevertheless, autologous tissue transfer has multiple advantages compared to implant-based breast reconstruction, especially in the context of radiotherapy and appearance.<sup>14,15</sup>

Complete decongestive therapy has been the standard conservative therapy for BCRL in past decades, and may mildly improve or avoid the progression of the BCRL, but it does not offer a cure. Previous studies on lymphedema microsurgery, including lymphovenous anastomoses and vascularized lymph node flap transfer, have shed light on patients with BCRL.<sup>16–26</sup> Specifically, these physiologic approaches bypass lymph drainage into the venous system with a direct lymphovenous anastomosis or indirect drainage via transferred lymph nodes.

However, few studies have compared the outcome of different types of lymphedema microsurgery with or without microsurgical breast reconstruction for BCRL. This study investigated the outcome of lymphedema microsurgery, including lymphovenous anastomosis and vascularized lymph node flap transfer, with or without microvascular breast reconstruction for the treatment of BCRL.

## METHODS

This study was approved by the institutional review board (101–3481B). All patients with breast cancer and BCRL who underwent 1 of 3 treatment modalities (complete decongestive therapy, lymphovenous anastomosis, or vascularized lymph node flap transfer) with or without microsurgical breast reconstruction at a single hospital (Chang Gung Memorial Hospital) were retrospectively included in this study. Patients who underwent simultaneous lymphovenous anastomosis and vascularized lymph node flap transfer were excluded from this study. All patients underwent the same preoperative evaluation, including lymphoscintigraphy, indocyanine green lymphography, Doppler ultrasound for the recipient venous system and quantity of donor lymph node basin, and magnetic