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# Risk of donor-site lymphatic vessel dysfunction after microvascular lymph node transfer

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## KEYWORDS

Lymphoedema;  
Breast  
reconstruction;  
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Autologous

**Summary** *Background:* Microvascular lymph node transfer has been used to improve lymphatic function in patients with lymphoedema. We previously reported changes in the lymphatic function of the donor limb after lymph node transfer. For this reason, we modified our surgical method to be more conservative.

*Subjects and methods:* Microvascular lymph node transfer was performed in 13 patients using the previously reported original method. Sixteen patients were operated upon using the more conservative modified method. Lymphatic function in the donor limb was evaluated using volumetry, lymphoscintigraphy and tissue water percentage.

*Results:* In the original method group, the donor-limb volume was on average greater ( $199 \pm 540$  ml) than in the non-operated control limb. The volume difference between the limbs was smaller ( $151 \pm 463$  ml) in the modified method group. Two patients in the original method group had abnormal transport index (Ti) values in lymphoscintigraphy indicating decreased lymphatic function of the donor limb. In the modified method group, the Ti-values remained normal. The tissue water percentage of the donor limb was on average  $40\% \pm 4\%$  in the original method group and  $40\% \pm 3\%$  in the modified method group. Importantly, none of the patients in either group developed clinical lymphoedema in the donor limb during the 11–84-month follow-up.

*Conclusions:* Even with the more conservative lymph node transfer method, we can observe slight, subclinical signs of lymphatic dysfunction in the donor limb. These results highlight

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the importance of minimizing the surgical exploration in the inguinal area and avoiding damage to the lymphatic vessels or sentinel nodes draining the lower limb.

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## Introduction

Chronic lymphoedema is a challenging clinical problem that still lacks definitive curative treatment.<sup>1</sup> It is often caused by surgery, radiation therapy or trauma.<sup>2</sup> Chronic lymphoedema in its late stages involves adipose tissue hypertrophy and fibrosis.<sup>3</sup> According to a recent review, the incidence of breast cancer-related arm lymphoedema is 19.9% after axillary lymph node (LN) dissection and 5.6% after sentinel node biopsy.<sup>4</sup> Currently, lymphoedema treatment is mainly symptom-based therapy, compression therapy and manual lymphatic drainage. At the late stages, liposuction is used to reduce the volume of the affected limb.<sup>3</sup> Reconstructive surgical treatments, for example, autologous microvascular LN transfer, are not yet considered to be first-line treatment options. Importantly, patients who undergo LN transfer surgery because of previously manifested lymphoedema might be genetically more prone to develop postoperative lymphoedema.<sup>5,6</sup> Because LN transfer is a fairly new technique, it is important to gather information about the possible harmful effects and develop the surgical method accordingly.

In our previous study,<sup>7</sup> we investigated how the harvest of the lymphatic flap from the groin affects the lymphatic function of the donor limb. There were subclinical indications that the surgery might have negative effects on the lymphatic flow of the donor area as shown by lymphoscintigraphy. However, no clinical symptoms of lower-limb lymphoedema were observed. Recently, there have been a few documented cases of donor-limb lymphoedema after autologous LN transfer. Pons et al.<sup>8</sup> reported chronic donor-site lower-limb lymphoedema in one of 42 patients. In a study by Vignes et al.,<sup>9</sup> two of 14 patients developed postoperative lymphoedema of the donor lower limb.

Due to a concern towards the negative donor-site effects of the LN flap harvest, we altered our surgical method to be more conservative. In the modified method, the surgical exploration does not extend to the medial side of the femoral artery and the superficial inferior epigastric arterial (SIEA) vessels are not used as flap pedicle vessels. The modified flap design is based on the localization of the lower-limb sentinel LNs in the groin area (Figure 1).<sup>10</sup>

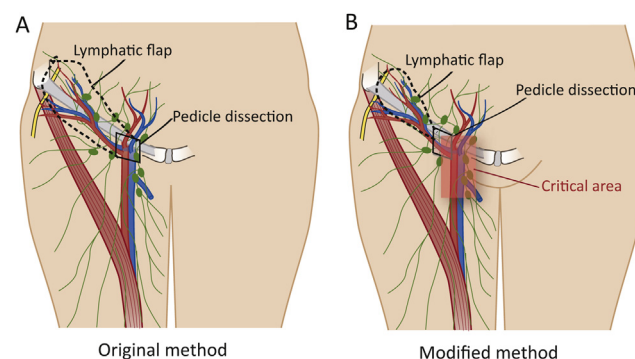
The aim of this study was to evaluate the effects of the more conservative modified method on the donor limb and report the long-term results of the original group (see study design in Figure 2).

## Patients and methods

### Patients

Our study design was approved by the ethics committee of the Turku University Hospital. Thirteen patients were

operated upon using the original method in the period between May 2007 and September 2011, and 16 patients were operated upon using the modified method between October 2011 and June 2013, by the same surgical team. The mean age of patients was  $55 \pm 10$  years (range 37–74) in the original method group and  $51 \pm 8$  years (range 31–68) in the modified method group. Simultaneous LN transfer and breast reconstruction (LN–BR) was performed in nine patients using the original method and in 12 patients using the modified method. LN transfer alone was performed in four patients in both groups. The indication for LN transfer was either symptomatic upper-limb lymphoedema or lymphoedema and recurrent erysipelas infections and/or chronic pain. None of the patients had previous lower limb oedema symptoms. The average body mass index (BMI) was  $29.0 \pm 3.6$  in the original method group and  $26.6 \pm 2.8$  in the modified method group. In both groups, one patient suffered from diabetes mellitus type II (DM II), and in the original method group one patient was a smoker. The patient with DM II in the modified method group (Id 16) had a previous history of deep vein thrombosis in the donor limb. Five patients (5/13) in the original method group and eight patients (8/16) in the modified method group underwent previous surgical operations on the lower abdominal or inguinal area. Preoperative limb measurements were not performed. All patients were considered to be cancer free by an oncologist before



	Original method	Modified method
	Months after surgery	
Volumetry	38±20	11±5
Lymphoscintigraphy	17±15	7±2
Tissue water percentage	48±16	11±5
Follow-up period	52±17	23±6

**Figure 1** The flap design in the original (A) and modified (B) method group. (C) Table of average follow-up period in the original and modified method group.

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