CASE REPORT

A case of donor-site lymphoedema after lymph node—superficial circumflex iliac artery perforator flap transfer

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LNL-SCIP flap;
Donor-site lymphoedema

Summary Vascularised lymph node transfer is a promising technique to treat limb lymphoedema, especially when caused by lymph node dissection. The most common approach is the transfer of superficial inguinal lymph nodes using groin flaps or superficial circumflex iliac artery perforator flaps. Lower-limb lymphatic sequelae are unexpected as these lymph nodes should drain lymph from the lower abdominal wall. Recently, Vignes et al. described two cases out of 26 cases of chronic lymphoedema after superficial inguinal lymph node harvest. From a series of 42 vascularised lymph node transfers performed at our centre, only one patient developed swelling in the donor thigh. The features of this patient who underwent a lymph node-containing superficial circumflex iliac artery perforator flap are reported herein. We recommend maximal accuracy in selecting the appropriate lymph nodes for transfer and provide some tips from our experience.

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Secondary chronic limb lymphoedema is a disabling side effect of groin and axillary lymph-node (LN) surgery. Patients who do not respond adequately to complex decongestive therapy can benefit from microsurgical treatment.

Vascularised lymph-node transfer (LNT) is becoming quite popular in improving the defective limb lymphatic drainage after LN clearance, especially in breast cancer-related lymphoedema patients. The most common approach is the transfer of superficial inguinal LNs to the axilla or wrist using groin (LN-GROIN) flaps or superficial circumflex iliac artery perforator (LN-SCIP) flaps. For post-mastectomy patients with arm lymphoedema, micro-vascular breast reconstruction using an abdominal free flap can be performed in combination with LNT.

As superficial inguinal LNs drain the supraclavicular region, no functional sequelae are expected in the lower limb. Nevertheless, Vitanen et al. described unexpected changes in lymphatic transport in the leg after LNT, while Vignes et al. reported cases of irreversible iatrogenic lymphoedema. The clinical features of a patient who developed chronic thigh swelling after an LN-SCIP flap procedure are reported herein.

Clinical details

A 52-year-old woman had a right modified radical mastectomy and axillary LN dissection (ALND) for a ductal carcinoma in June 2003 (zero positive LNs). Breast reconstruction with a latissimus dorsi (LD) myocutaneous flap and implant was performed, followed by adjuvant radiotherapy (RT), chemotherapy (CT) and hormone therapy (HT). Third-degree arm swelling was detected 8 months after the operation.

In February 2008, neo-adjuvant CT was performed for contralateral lobular cancer, followed by left mastectomy with expander placement, sentinel LN (SLN) biopsy removing two negative LNs and RT-HT. First-degree left-arm lymphoedema was detected 6 months later. In May 2012, the left breast was reconstructed using an LD myocutaneous flap with implant, and the contralateral implant was exchanged.

As complex decongestive therapy gave unsatisfactory results and recurrent right-arm lymphangitis was reported, in February 2011 a left LN-SCIP flap was harvested. The flap was based on the superficial branch of the superficial circumflex iliac artery and included at least three superficial inguinal LNs embedded in the surrounding fat tissue. Anastomosis was performed to the right thoracodorsal vessels after adequate axillary scar release (Figure 1).

Swelling of the left thigh appeared 3 months later, and symptoms were still present at the 24-month follow-up (Figure 2).

The patient had a 25-pack-year history of smoking. Her body mass index (BMI) was 24.0 kg m². Family history revealed a grandmother who suffered from third-degree breast cancer-related lymphoedema.

Upper- and lower-limb evaluation

Limb circumferences were assessed with a common tape: at first preoperatively, then every 3 months for the first year and every 6 months for the second year. Reference circumferences for the upper limb were the cubital crease, point "zero" (K), +10 cm (A) in the upper arm, −10 cm (B) and −20 cm (C) in the forearm, the wrist (D) and the base of the first finger (E).

Reference points for the leg were the popliteal crease, point "zero" (K), +30 cm (A), +20 cm (B), +10 cm (C) in the thigh, −10 cm (D), −20 cm (E), −30 cm (F) in the lower leg and 10 cm proximal from the tip of the first toe (G). Using those measurements, upper limb as well as thigh (points A to C) and leg (points A to G) volume were calculated.

Postoperative lymphoscintigraphy (LS) was performed to assess upper- and lower-limb lymphatic function. 99mTc-labelled human serum albumin (37 MBq, 0.1 ml volume) was administered subcutaneously in the second and fourth interdigital space. Images were taken immediately and 180 min after the injection.

Results

Preoperative leg circumferences showed no difference between the left and the right leg. At the 24-month follow-up, upper- and lower-limb measurements were compared to the preoperative values. A 2-cm enlargement of the left thigh circumferences at points A, B and C was detected (Figure 2). The percentage increase of the affected thigh was 8.5% and 6.2% considering the whole leg.

Immediate LS images showed tracer migration only in the healthy right leg (Figure 3). Later images confirmed
normal lymphatic flow in the right limb and delayed drainage in the left limb, with no dermal backflow. Findings were judged compatible with left superficial inguinal LN harvest and compatible with the results of Vittanen et al., assessed by experienced nuclear medicine physicians.

Right-arm lymphoedema improved an average of 1.5 cm and volume decrease was 9.8%, while lymphoscintigraphic images showed two functioning transplanted LNs in the right axilla, which were absent preoperatively.

Discussion

In our surgical experience based on a series of 42 vascularised LNTs (22 lymph-deep inferior epigastric perforator (LN-DEP) flaps and 20 LN-SCIP or LN-GROIN flaps) for which moderate objective and significant subjective clinical improvements have been achieved, only one patient developed chronic swelling in the donor thigh after LN-SCIP flap transfer.

The vascularised LNT is a well-described procedure. Despite the fact that preliminary results in reducing limb lymphoedema seem attractive, further evidences are needed to prove its complete safety and efficacy. Although superficial inguinal LNs should drain lymph from the lower abdominal wall, Vittanen et al. observed minor postoperative lymphoscintigraphic changes in the lower limb after LNTs of 6/10 patients and abnormal flow in 2/10 patients. However, no cases of donor-site lymphoedema have been described in the few series reported to date. Recently, Vignes et al. published a single-centre surgical experience including 2/26 patients suffering from inferior limb persisting iatrogenic lymphoedema.

In our patient, LS showed lymph flow delay in the affected lower limb, in the absence of transport insufficiency and the lymphoscintigraphic images were comparable to the findings of Vittanen et al. Nevertheless, clinical evaluation revealed a 2-cm difference between the preoperative and postoperative affected thigh, while the difference in volume was 8.5%. Although there are no standard cut-off values for the diagnosis of lymphoedema, we considered as significant an increase of 2 cm. The assessment of leg circumferences over time (Table 1) demonstrated that swelling began early in the proximal third of the thigh, then extended to its distal segment. Lymphoedema stabilisation occurred after 12 months.

The relationship between the number of LNs excised and donor-site lymphatic sequelae is well known; however, other parameters should be considered. Interestingly, the patient developed bilateral arm lymphoedema of the first and third degree, 6 and 8 months respectively after surgery. Family history revealed that the patient’s grandmother also had third-degree breast cancer-related lymphoedema. Constitutional predisposition and susceptibility to develop lymphoedema were thus supposed. The patient refused genetic analysis.

Anatomical studies have shown that 5%—10% of lower-limb SLNs are located superolateral to the femoral artery. As we approach this anatomical region surgically, extreme accuracy is recommended to avoid unnecessary scarring around the remaining LNs.

In order to identify suitable LNs for the harvest, other methods may be adopted together with conventional intradermal supraclavicular injection of Patent Blue dye. Koshiba et al. suggested preoperative indocyanine green (ICG) lymphography to detect the dominant leg LNs that will not be harvested. Furthermore, information provided by abdominal radiotracer injection to detect superficial inguinal LNs could also be added.

Preoperative identification of lower-limb lymphatic flow abnormalities in sub-clinical lymphedematous patients is becoming a relevant issue. Semiquantitative analysis of the dynamic LS could provide valuable data regarding the increased risk of developing lymphoedema after surgery. Similarly, ICG lymphography can detect possible dermal backflow patterns corresponding to lymphatic flow dysfunction. These techniques, either
Immediately post-injection 180 min post injection

Figure 3: Immediate LS revealed tracer migration only in the right lower limb. Images acquired 180 min after the injection showed normal right ilioinguinal groin LNs drainage. Reduced drainage was assessed in the left lower limb with prevalence of inguinal groin LNs and only a few iliac LNs. No dermal backflow was detected.

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* Reference points on leg.
individually or in combination, may provide an effective
correction to the prevention of lymphatic changes or
lymphoedema at the donor site. However, patients should
always be alerted to the fact that LNT is not a risk-free
procedure.8

Ethical approved

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Conflict of interest statement

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