# Reconstructive Lymph Vascular Surgery and Other Lymphedema Treatment Modalities

6

## 6.1 Resection of Accumulated Fat via Liposuction Secondary to Lymphatic Flow Reconstruction

One of the sequels of diminished lymphatic transport which causes lymphedema is the surplus of fat tissue. In advanced forms improvement of lymphatic transport alone may not be sufficient for the patient if he strives for a normal appearance of the extremity. This is highly important in particular for arm edemas since it is more difficult to hide the upper than the lower extremities.

Reducing or eliminating the surplus of fat should be done with lymphatic vessel-sparing technique, if beforehand the lymphatic transport has been restored or at least improved by lymphatic vessel grafting.

In two studies we have examined the interaction between liposuction and the main lymphatic collectors.

It was shown that, at least under tumescence conditions, the danger to harm bigger lymphatic collectors is minimal (Frick et al. 1999, 2006; Hoffmann et al. 2004).

The anastomoses are located proximal to the area of edema. Mostly they are located at the upper part of the extremity. On the other hand, liposuction is performed within the edematous region distal to the anastomosing site. Therefore liposuction without damaging lymphatic anastomoses can be applied after reconstruction.

We perform it always after a time interval. Mostly after about 1 year. The patient can experience the result of the grafting and decide if he is satisfied with it. Mostly also the effect of the grafting is documented by a lymphoscintigraphy prior to secondary liposuction.

Up to now only in one patient a lymphatic grafting was performed as secondary procedure since the liposuction was performed earlier at another institution. The first liposuction has been performed according to our proposal of a lymph-sparing liposuction.

First experiences with nine patients suffering from secondary arm edemas have been published.

The preoperative mean volume of $3273 \pm 292$ cm$^3$ was decreased to $2214 \pm 149$ cm$^3$ after reconstructive surgery followed by liposuction. This was in the range of the normal contralateral arm with $2164 \pm 140$ cm$^3$ ($P < 0.001$) (Baumeister et al. 2007) (Fig. 6.1, Table 6.1).

Currently further investigations are in progress.

The example depicts the history of a 60-year-old patient suffering from a secondary lymphedema of the left arm after axillary dissection in breast carcinoma.

Figure 6.2a shows the status prior to reconstructive surgery 30 months after breast-conserving therapy which was followed by conservative treatment. The left arm is markedly swollen.

The patient underwent lymphatic grafting and 2 years later a secondary liposuction.

Figure 6.2b shows the patient in her garden in summer dress. The formerly markedly swollen left arm showed now even less volume compared to the normal arm. No additional treatment is applied.

The combination of reconstructive lymph vascular surgery and low-invasive resection of accumulated fat gives an answer to the two main problems in lymphedema, the deficiency in lymphatic transport and the accumulation of fat and fibrous tissues.

## 6.2 Reconstructive Lymphatic Microsurgery and Conservative Treatment

Surgical and nonsurgical treatments should not be considered contradictory to each other. They should be understood as supplementary to each other. With respect to microsurgical restoration of the lymphatic system after medical interventions, first nonsurgical treatment should be performed. During this period of about 6 months, also transient edemas may disappear and surgery can be avoided.

After reconstruction, compression garment is normally applied during a period of about 6 months in order to



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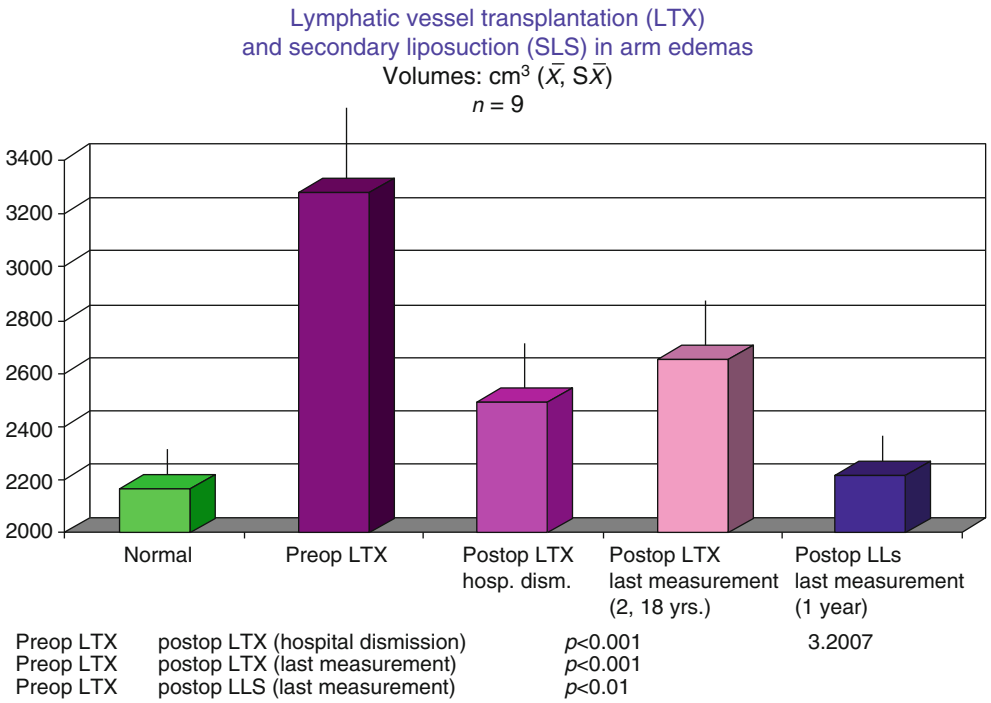


**Fig. 6.1** Results of the upper limbs

**Table 6.1** Mean arm volumes prior to transplantation of lymphatic vessels compared to the volume after secondary liposuction

| Lymphatic vessel transplantation (LTX) and secondary liposuction (SLS) in arm edema<br>Volume: $cm^3(\bar{x}, s\bar{x})$<br>$n = 9$ | | | | |
|---|---|---|---|---|
| Normal | Preop LTX | Postop LTX | Postop LTX last measurement (2.18 years) | Postop LLS last measurement (1 year) |
| 2164 ± 140 | 3273 ± 292 | 2490 ± 202 | 2647 ± 201 | 2214 ± 149 |
| Preop LTX → postop LTX | | | $p < 0.001$ | |
| Preop LTX→ postop LTX (last measurement) | | | $p < 0.001$ | |
| Preop LTX→ postop LLS (last measurement) | | | $p < 0.001$ | |

facilitate the influx into the anastomoses by increasing the pressure within the tissue distal to the anastomoses.

During these six postoperative months, we do not recommend manual lymph drainage. The net effect of the reconstructive procedure can be observed without interference with another lymphatic transport-stimulating technique.

Additionally, we had not seen a difference between two groups: with and without additional manual lymph drainage in a pilot study with 20 patients.

After this postoperative period of about 6 months, the transient compression garment is removed, and possible worsening is carefully watched.

Thereafter about one-third of the patients experience stable conditions and do not need any further additional treatment. One-third use additional compression especially under working condition, and one-third need compression therapy and manual lymph drainage as well.

Already in an early study on 34 patients with arm edemas, we saw similar courses. All patients had compression therapy and manual lymph drainage prior to surgery. After the period of 6 months with the routine compression, 14 patients could leave out completely the compression. Nine used it only temporarily during strong working conditions. Eleven patients used it furthermore continuously.

Twenty-four out of the 34 patients were able to omit the manual lymph drainage after the reconstruction completely. Ten patients restarted the additional treatment by manual lymph drainage (Baumeister 1990).


**Fig. 6.2** (**a**) A 60-year-old patient with lymphedema of the left arm after breast-conserving therapy. (**b**) 5 years after secondary liposuction following lymph vascular reconstruction without additional treatment (© Baumeister)

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