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Liposuction as an effective treatment for lower extremity lymphoedema: A single surgeon's experience over nine years

C.J. Stewart *, D.A. Munnoch

Department of Plastic and Reconstructive Surgery, Ninewells Hospital, Dundee, United Kingdom

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KEYWORDS
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Summary *Background:* Lymphoedema is a chronic, debilitating condition caused by a compromised lymphatic system. In recent years, the success of treating upper extremity lymphoedema with liposuction has been translated to patients with lower extremity lymphoedema (LEL), yet there remains a paucity of clinical evidence firmly supporting its use within this patient group.
Methods: 69 patients with LEL (72 legs) were consecutively treated with liposuction by a single surgeon. Compression garments were applied in theatre and continued postoperatively.
Results: Mean preoperative volume of oedema was 4372 mL (range 229–15,166 mL), and mean volume of aspirate was 4550 mL (range 575–12,150 mL). There were no major surgical complications. An average reduction in volume of leg oedema of 85% was found at 3 months (n = 72), 88% at 1 year (n = 60), 94% at 2 years (n = 41) and 90% at 5 years (n = 15).
Conclusions: We have demonstrated that liposuction combined with continuous compression therapy (CCT) is a safe and effective technique for treatment of primary and secondary LEL, with a significant reduction of the original excess limb volume. Male patients with primary lymphoedema have the poorest outcomes. Limbs with secondary lymphoedema respond best to this treatment.

Introduction

Lymphoedema is a chronic, debilitating condition characterized by the abnormal accumulation of proteinaceous fluid in skin and subcutaneous tissue, with subsequent adipose and fibrous tissue hyperplasia.[1,2] This is caused by obstruction of the lymphatic drainage, which may be primary or secondary in origin. Although probably underestimated, approximately

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* Corresponding author. Department of Plastic and Reconstructive Surgery, Ninewells Hospital and Medical School, Dundee DD1 9SY, United Kingdom.
E-mail address: camilla.jay.stewart@gmail.com (C.J. Stewart).

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140 million to 250 million people worldwide have lymphoedema, with as many as 120 million people in mosquito-plagued regions developing lymphoedema as a result of nematode infection (Wuchereria bancrofti).[3] In Western countries, lower extremity lymphoedema (LEL) is often an iatrogenic consequence of cancer treatment.[4] Unilateral LEL occurs in 41% of patients with gynaecologic cancer, whilst a 5%–66% incidence of LEL has been reported in patients treated for prostate cancer.[5] This incidence depends on whether radical removal of lymph glands is done in addition to radiotherapy.[5–7]

Primary lymphoedema which is caused by an intrinsic defect in the lymph vessels or lymph glands, is localized to the lower extremities in most cases. The congenital primary oedema termed Milroy's disease is found more frequently in some families, and is characterized in a subpopulation of patients by aplasia of the small lymphatics secondary to a genetic mutation in VEGFR-3. Lymphoedema praecox, a milder form of idiopathic lymphoedema, accounts for 80% of cases, and presents before the age of 35 years usually in women at puberty. Lymphoedema tardum occurs after the age of 35 years.[8]

Presently, there is no known cure for lymphoedema. The mainstay of treatment is conservative, with a mixture of bandaging, manual lymphatic drainage (MLD) and compression garments, all of which are beneficial. However, these treatments have little effect on the accumulated fat. Various surgical interventions are described, although the reported outcomes are variable. These may be physiologic to re-establish lymphatic connections, or excisional, to remove excess tissue.[9] Microvascular techniques have also been used to establish lymphatic venous anastomoses, either at the subdermal or deep fascial level, by autologous lymph vessel transplantation, and by vascularised lymph node transfer.[10–13] These techniques can improve drainage, but have no effect on the fat, and further work is necessary to determine proper patient selection and ensure minimum donor site morbidity. Various excision techniques, with or without skin grafting remain an option in severe cases, but these patients often develop troublesome skin complications including eczema, ulceration, erysipelas, keloids, lymph fistulas and papillomatosis.[14–16]

Reduction of the volume of the LEL with liposuction alone is a new approach, with preliminary clinical reports warranting further refinement and evaluation.[8,9,17–19] Following demonstration of the long-term beneficial effect of liposuction with controlled compression therapy (CCT) in the treatment of patients with chronic arm lymphoedema after breast cancer, recent studies have focused on its use in LEL, and have examined the role of adipose tissue hyperplasia and accumulation in the pathology of lymphoedema.[20–23] Chronic inflammation is a likely contributing factor, with the beneficial effect of liposuction secondary to the removal of this hypertrophied adipose tissue. Increased blood flow and removal of adipose tissue could explain the reduced incidence of erysipelas seen in these patients.[24]

The indication for liposuction in our clinic is a non pitting oedema of the extremity and a lack of volume reduction by conservative regimens. In this paper, we describe our surgical technique, and report our results from a prospective series of patients operated on by the senior author.

Patients and methods

Patients

69 patients with a mean age of 46 years (range 20–81) and mean disease duration of 19 years (range 4–66) were consecutively operated on between November 2007 and December 2016, having been referred from across the UK & Eire. 66 patients had unilateral leg oedema, and three patients had bilateral leg oedema (one bilateral primary, one bilateral secondary, and one initially treated for unilateral secondary lymphoedema, who subsequently developed contralateral primary lymphoedema). 42 legs had primary lymphoedema, and 30 had secondary lymphoedema (Table 1). Where necessary, primary cases underwent lymphoscintigraphy or MRI lymphangiography to confirm the diagnosis of lymphoedema, however most patients were referred with a confirmed diagnosis by other clinicians.

All patients had previously been treated conservatively with decongestive therapies (MLD, bandaging, compression) without satisfactory results. In most cases, the leg was soft on palpation with minimal pitting (pressing with thumb for one minute). All patients were of an International Society for Lymphoedema (ISL) Stage 2 or 3. For patients with bilateral lower leg oedema, liposuction was performed on each leg separately, with a minimum of three months between operations.

The total excess volume varied between 229 and 15,166 mL, and was measured by taking circumferential measurements with the Frustrum truncated conal volume calculation at 4 cm intervals. This technique of measurement has been validated in many previous studies.

Table 1 Patient demographics.

	Primary legs (n = 42)	Secondary legs (n = 30)
Male	7	0
Female	35	30
Age/years	41 (20.5–68)	52 (36–81)
Duration with lymphoedema/years	20 (4–45)	18 (4–66)
History of cellulitis/years	8	13
Preop excess volume/mL	4480 (848–15,166)	4150 (229–12,001)
Aspirate fat/mL	3092 (650–7100)	3228 (575–7450)
Aspirate lymph/mL	682 (0–6800)	757 (0–3850)