A review of the literature relating to liposuction in women with lipoedema and Dercum's disease

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Key words

Adverse effects, Dercum's disease; lipoedema; liposuction; outcome measures

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Abstract

This paper reports on a review of the literature on liposuction for women with lipoedema and those with Dercum's disease. The aims were: to identify the outcomes from liposuction in these two groups; and describe adverse effects reported in the studies. A total of 10 studies met the inclusion and exclusion criteria, dated between 2006–2019. Improvements in pain, quality of life and mobility were common outcomes. There were indications that reliance on conservative treatments reduced after liposuction. The incidence of adverse effects appeared modest, including minor haematomas, postoperative swelling, orthostatic reactions, temporary bruising and burning sensations. However, the numbers studied were relatively small, particularly relating to Dercum's disease. Findings were limited by retrospective evaluations, use of poorly validated tools and relatively short follow-up periods in some studies. There were no randomised clinical trials. Lack of standardisation made it challenging to analyse and compare outcomes across different studies. Liposuction appears to play a role as a treatment option for some women in managing symptoms. However, further research is required to better explore efficacy and cost-effectiveness, monitor adverse effects, inform decision-making and identify key advice for women who undergo liposuction.

Liposuction is a surgical option in the management of fat disorders, such as lipoedema and Dercum's disease (*Box 1*) (Lontok, 2017; Wounds UK, 2017), particularly where there has been inadequate response to conservative therapy (Halk and Damstra, 2016). Liposuction is not a cure for lipoedema and is not suitable for everyone. However, when faced with debilitating symptoms, such as pain, poor mobility, and the distress of appearance changes (Dudek et al, 2018), many women seek liposuction in conjunction with conservative self-management approaches. Some people travel within Europe for private treatments, as there are very limited opportunities for surgery within the NHS in the UK (Wounds UK, 2017).

The pathogenesis of lipoedema is not fully understood, but may include capillary fragility, angiogenesis, inflammatory processes and impairment of lymphatic function (Okhovat and Alavi, 2015). Conservative therapies provide opportunities to optimise health and manage symptoms (Wounds UK, 2017). However, it is important to review the evidence for surgical treatment options, such as liposuction, and identify any adverse effects reported in the literature.

Background to liposuction

Liposuction, first introduced as a surgical procedure in the mid-1970s (Rapprich et al, 2012; Bellini et al, 2017), is the suction-assisted removal of excess epifascial subcutaneous adipose tissue, via a cannula inserted through small incisions in the skin (Shridharani et al, 2014). Also referred to as lipectomy or lipoplasty, it is one of the most commonly performed aesthetic procedures, and is also used in various other medical conditions (*Box 2*). In a survey of 250 women with lipoedema, 7.6% had undergone liposuction, with 74% of those women reporting it as 'effective' (Fetzer and Fetzer, 2016).

Types of liposuction used in lipoedema include:

- Tumescent liposuction: large amounts of solution containing anaesthetic are introduced into the area to cause numbing, constrict blood vessels, and separate the fat and connective tissue (Lontok et al, 2017)
- Water-assisted liposuction: small amounts of tumescent solution are inserted and a water jet is used to separate the fat tissues, while detached cells and solution are aspirated (Lontok et al, 2017)
- Suction-assisted dry liposuction under tourniquet (Warren Peled et al, 2016).

Criteria for liposuction in lipoedema

Surgical teams vary in their approaches, and there are no consistent or standardised criteria regarding suitability for liposuction in lipoedema within the current literature. However, a key focus is on removing excess fatty tissue, where there is little or no pitting oedema, in order to improve pain, function and mobility (Forner-Cordero et al 2012). In managing lipoedema, the legs,

Box 1. Definitions of lipoedema and Dercum's disease.

Lipoedema: characterised by a symmetrical distribution of fat, which is often painful and nodular, with fat lobes developing particularly in the limbs, leading to difficulties with movement (Wounds UK, 2017).

Dercum's disease (adiposis dolorasa): similar presentation and symptoms to lipoedema, but rare (Lontok, 2017); characterised by pain and abdominal involvement.

Box 2. Examples of medical conditions suitable for liposuction (Shrisdharani et al, 2014; Bellini et al, 2017).

- Lipoedema
- Lymphoedema
- Leakage around stoma sites due to bugling fatty skin fold
- Fatty areas due to insulin injection
- Multiple familial angio-lipomatosis
- Gynaecomastia
- Benign symmetrical lipomatosis
- Retorviral medication-induced lipodystrophy
- Steroid-induced Cushing's disease
- Post bariatric body contouring
- Scar revision
- Axillary hyperhidrosis.

arms, buttocks and abdomen are commonly treated areas, with multiple operations usually required (Forner-Cordero et al, 2012). The operation, depending on circumstances, may be performed under local or general anaesthetic, and it can take around 2–4 hours for around 6–7 litres of fat to be removed from a leg.

Review process

Aims of the review

The key aims of the review were to analyse the evidence to:

1. Identify the outcomes for liposuction in women with lipoedema, and women with Dercum's disease
2. Describe adverse effects reported in the studies.

Search strategy

Databases searched included: Medline, CINAHL and PubMed. Reference lists of papers and best practice guidelines were also scrutinised for further research evidence. Search terms included: lipoedema or lipedema or Dercum's disease combined with liposuction; lipoplasty; lipectomy; tumescent; and adverse effects. The inclusion criteria were papers published in English that were research studies of liposuction. Exclusion criteria were papers focusing on lymphoedema; 'cankle' surgery not identified as lipoedema; single case study reports; bariatric surgery; and histologic analyses.

A total of 177 papers were identified in the search. When inclusion and exclusion criteria were applied, this was reduced to 10 papers suitable for the review. A modified critical appraisal tool (CASP, 2019) was used for data extraction.

Review findings

Outcomes of liposuction

A group from the Hanse-Klinik in Lübeck, Germany, reported the first study of liposuction in women with lipoedema, which aimed to determine the efficacy and safety in relation to appearance and associated complaints (Schmeller and Meier-Vollrath, 2006). Between 2002 and 2005, 28 women with lipoedema (mean age 37.7 years), who previously had conservative treatments for many years, were treated by tumescent liposuction with local anaesthesia.

A total of 49 operations were performed, with a mean 3,017 mls removed at each session. Twenty one patients were evaluated postoperatively between 1 to 26 months (mean 12.2 months). The authors commented that: "All experienced a satisfactory, often dramatic, improvement in body proportions" (Schmeller and Meirer-Vollrath, 2006). Of the 18 patients experiencing pain before surgery, 16 (89%) experienced an improvement in pain levels. Improvements in sensitivity to pressure, oedema, bruising and quality of life were also recorded, although no measurement tools or statistical analysis were applied. The authors identified that physiotherapy and compression were still required following surgery, and did not report any adverse effects from liposuction.

In a subsequent publication, Schmeller et al (2012) reported findings from a questionnaire completed by 112 patients who underwent a total 349 tumescent liposuction sessions between 2003 and 2009 at the Hanse-Klinik. The women were between 1 year 1 month and 7 years 4 months (mean 3 years and 8 months) since their first liposuction surgery, with 100 of these patients operated on more than once; a mean 3,077 mls (range 450–7,000 mls) of fat was removed per session. The seven-item instrument developed for the study used a five-point scale (0–4) to evaluate seven complaints: spontaneous pain; sensitivity to pressure; oedema; bruising; restriction of movement; cosmetic appearance; and reduction in quality of life. The paper also provided a mean total score of general impairment with data subjected to t-tests and analyses of variances.

The authors reported a statistically significant improvement in mean scores for all seven items (P=<0.001) with the highest scores in effect size being seen in improved cosmetic appearance and quality of life. When general impairment was analysed according to age, stage of lipoedema, and time since surgery, those with stage 2 and 3 lipoedema (77 of the total group), appeared to have a greater improvement compared to those with stage 1. A total of 93 of the 112 patients (83%) had undergone conservative treatment, such as manual lymph drainage and/or compression prior to surgery, with 22.4% no longer requiring any conservative treatment (and 19.4% continuing with conservative treatments) following surgery.

Baumgartner et al (2015) further followed up 85 of the 112 patients evaluated in the above study, using the same questionnaire mailed to the women in 2014, and provided some evidence for the long-term outcomes of liposuction. At this second follow-up point, the average age of the women was 47.4 years, with follow up taking place a mean 7 years and 6 months since their last surgery. The scores for the seven items remained significantly lower (improved) than prior to liposuction, but there was a slight increase in impairments in all scales, and for overall impairment, from the previous study time point. The increases in bruising, restricted movement, cosmetic impairment and impaired quality of life were all statistically significant (P<0.5), but identified as not clinically relevant by the authors.

Quality of life and reduction in overall impairment both remained improved from pre-liposuction levels. Analysis using two-way anaylsis of variances (ANOVAS) showed that age was insignificant in terms of the effectiveness of the intervention. The authors suggested that greater improvement in overall impairment occurred in those with stage 2 lipoedema, compared to those with stage 1. Of the 47 patients included in this

study that were using conservative treatments pre-operatively, 30% no longer required these, 60% used them less frequently and 10% used them as before.

Another German team (Rapprich et al, 2010) reported on a study of 25 patients with a mean age of 38 years (range 22–65) who were followed up 6 months after their last liposuction procedure in a dermatology unit. Leg volumes were recorded using 3D imaging, and patients undertook self-assessment of symptoms using a quality of life tool (FLQA-1) (Augustin et al, 2005) before surgery and 6 months after their last surgery. Liposuction was performed using tumescent local anaesthesia with vibrating cannulae, and 23 women underwent this as an outpatient procedure. Patients had one to five sessions (mean 2.5 +/- 1.1) treating thighs, knees, hips and lower legs, with 3 days antibiotic prophylaxis. Those having lower-limb liposuction had compression bandaging for 2–3 days after surgery, and all were advised to wear compression stockings for 4–6 months after surgery. However, there is no record of how consistently these were worn.

The 3D imaging showed a reduction in leg volume of between 0.9 and 4 litres (mean 1.2 +/- 1.01 litres). Fifteen symptom parameters were assessed: pain; sensitivity; bruising; tension; warmth; cold; muscle cramp; heavy legs; tired legs; swelling; skin involvement; itching; difficulty walking; affect on quality of life; and satisfaction with appearance. The authors suggested there was a highly significant improvement in pain (P<0.001), sensitivity to pressure and quality of life, although statistical details were not reported for all parameters. The scores were combined for a total possible score of 150, and a 58% improvement in total mean score (P<0.001) reported. Regarding conservative treatments, 15 (60%) patients had manual lymph drainage therapy pre-operatively with two (8%) continuing this postoperatively. While 76% of patients had worn compression therapy prior to surgery, only 16% reported still using compression therapy 6 months postoperatively.

The authors suggested that manual lymph drainage and compression therapy are an essential part of the healing process and treatment success, indicating that use of compression therapy may be lifelong. They also cautioned that while liposuction removes fatty tissue, lipoedema may continue to progress, suggesting that the follow-up period of 6 months is too short to assess long-term outcomes or recurrence.

A third team from Germany reported a series of studies of liposuction in women with lipoedema. Wollina et al (2010) described their evaluation of outcome and risks from tumescent liposuction in two women with lipoedema, and four women with Dercum's disease between 2004 and 2008. All six women had previously undergone conservative therapy with manual lymph drainage and compression garments; they all wore a compression garment for at least 6 months following surgery. One was treated as an outpatient and the others were in-patients. All had local tumescent anaesthesia with liposuction performed over a series of one to four sessions, with 500–1,800 mls removed at each session. Satisfaction was recorded as: unsatisfied; unchanged; medium; high; or very high. Follow-up at 6 months indicated high or very high satisfaction in five patients, and the authors reported reduced pain in three of those with Dercum's disease.

In a later paper, Wollina et al (2012) reported outcomes from 24 consecutive adult patients with painful lipoedema, and two with Dercum's disease. They were treated between 2005 and 2011, firstly with conservative decongestive therapy (manual lymph drainage and compression therapy), and then liposuction. During the study period, the team switched from using microcannular tumescent liposuction (for 43 sessions) to laser-assisted tumescent liposuction (for 22 sessions), with each patient undergoing between one to four sessions. The scoring system reported in the paper indicated that liposuction improved pain, mobility, bruising and self esteem more effectively than conservative therapy, although statistical analyses were not provided.

A more recent paper reported on 111 patients with a median age of 44 years, treated between 2007–2018, with tumescent liposuction (Wollina et al, 2019). This group included 21% of patients with a comorbidity of obesity and 11% with lymphoedema secondary to lipoedema. The mean total aspirate per patient was 4,700+/-7,579 mls, and a median 6 cm reduction in limb circumference was reported. A 10-point visual analogue scale recorded changes in pain, and a three-point scale was used to measure changes in bruising and mobility. Two-tailed Mann-Whitney U tests, used to analyse differences before and after treatment, showed statistically significant improvements in pain after liposuction (P<0.3). An improvement in mobility was achieved in 100% of the patients and a marked improvement in/complete loss of impairment was seen in 86% patients. Improved perception of mobility was reported by 100%, tendency to bruising on minor trauma improved in 50%, with a further 16.4% of patients no longer requiring conservative therapy.

Dadras et al (2017) aimed to determine the outcome of tumescent liposuction in 25 women with lipoedema who underwent a total of 72 liposuction procedures. This was a retrospective evaluation using an 18-item questionnaire incorporating visual analogue scales to assess the severity of spontaneous pain, pain upon pressure, feeling of tension, bruising, cosmetic impairment, and general impairment of quality of life. The questionnaire was completed by all patients at the end of 2013 and again in 2015. A mean 3,106 mL (range, 1,450–6,600 mL) of fat was removed at each session. The authors reported a reduction in spontaneous pain and in impairment of quality of life at the first postoperative time point, and significant improvement in all symptoms between the preoperative period and the second postoperative follow-up. However, there is a risk of bias and poor recollection as no data were collected prior to surgery.

Hansson et al (2011) in a study of 53 patients with Dercum's disease, aimed to assess the effect of liposuction on pain experiences. All participants completed questionnaires pre-operatively, at 3 months, 1, 2, 3 and 5 years, which incorporated: a visual analogue scale to record changes in quality and intensity of pain; and a number-of-words scale incorporating 12 sensory and 11 affective pain descriptors, adapted from the McGill pain questionnaire. An objective measure using a locally constructed and validated algometer designed to measure mechanical pressure pain threshold was also used to gather data at the same time points.

The average amount of fat removed in the liposuction group was 3,749 +/- 2,325 grams. Both objective and subjective pain measures revealed reduced pain postoperatively, although the improvement faded over time, but did remain statistically significant at 5 years (P=<0.001). The authors discussed various mechanisms for pain in Dercum's disease, including central and peripheral nervous system aetiologies, and identified the challenges of measuring changes in pain, suggesting that further randomised trials are required.

Adverse effects

From the 349 liposuction sessions reported by Schemeller et al (2012), five patients (1.4%) developed a postoperative wound infection, despite all receiving 3 days of postoperative antibiotics. One had developed an abscess that required hospital admission. One woman had postoperative haemorrhage with lowered haemoglobin levels returning to normal within 4 weeks. The authors also recorded minor haematomas, postoperative swelling, orthostatic reactions on the day of surgery, and indurations in the leg tissues that disappeared within weeks, although there are limited details in the paper.

Wollina et al (2010) reported an increase in haemoglobin levels in one patient, and infection with raised body temperature and leucocytosis in one patient, one instance of bleeding from varicose veins, and skin laxity that required further surgery in two patients >65 years. A later paper (Wollina et al, 2019) also reported fat embolism (n=1), pulmonary oedema (n=1), phlebitis (n=1), temporary bruising and burning sensations affecting 82% of the patient series, but no wound infections.

The study by Rapprich et al (2010) reported one incidence of deep vein thrombosis of the lower leg. However, there were no indications of other complications or worsening of the condition, and no new incidence of lymphoedema reported in the papers.

Conclusion

This review provides some evidence for liposuction in lipoedema and Dercum's disease. Improvements in pain, quality of life and mobility appear to be common outcomes, along with reduced reliance on conservative therapies. This suggests that liposuction may offer symptom management relating to the physical and psychological effects of lipoedema. It may also reduce the need for long-term decongestive conservative treatments, although more research is required to assess efficacy and cost-effectiveness of liposuction.

However, the numbers studied remain relatively small, particularly in relation to those with Dercum's disease. Findings are limited by retrospective evaluations, use of poorly validated tools, and relatively short time points for measuring outcomes, making it challenging to analyse the long-term effect on limb size and symptoms. To date, there have been no randomised clinical trials, and there is limited standardisation in the research designs, making it challenging to assess and compare outcomes across the various studies. Further, the literature does not provide robust evidence to inform suitability criteria for liposuction, nor what groups may benefit most from liposuction. There is some indication that those with stage 2 or 3 lipoedema had better outcomes than those with early lipoedema, although it is likely that the latter group initially presented with less severe symptoms. Outcome measures may lack sensitivity in terms of measuring the less obvious changes experienced by those with early lipoedema. There remains limited evidence to inform postoperative care, such as the use of compression therapy or manual lymph drainage in the immediate and longer postoperative period.

The incidence of adverse effects appears relatively modest, although it is difficult to comment on the extent of these problems are there is no standardisation in the reporting. Schmeller and Meier-Vollrath (2007) suggested that current anaesthetic and surgical techniques result in improved outcomes for liposuction in lipoedema, with limited lymph vessel damage (Stutz and Krahl, 2009). Warren Peled and Kappos (2016) also provided some evidence that lymphatic function is not compromised by liposuction. This may explain why there was no report of lymphoedema developing after liposuction, although further research may be required.

A review of non-English language literature would be useful. Future research to evaluate the outcomes and adverse effects in larger groups, using validated tools, is required to inform decision-making regarding liposuction in lipoedema, and identify key advice for women who undergo this treatment.

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