

# LIPOSUCTION VERSUS CONSERVATIVE TREATMENTS?

Lymphoedema maintenance therapy is time-consuming, laborious, and associated with diminished quality of life (QoL) (Cheville, 2002). Patients are understandably eager for discrete treatments that can permanently improve their condition and replace the unwelcome daily ritual of bandaging and garment use? Over the past decade, liposuction has hinted at such a promise; a one-time procedure that permanently reduces large limbs. Yet, has this tantalising promise been realised? Brorson et al taught the lymphoedema community that, for many patients, excess limb volume is comprised of fat (Brorson et al, 2006a) and that liposuction can achieve significant volume reduction (Brorson and Svensson, 1997). However, not all investigators have noted the dramatic reductions achieved by Brorson et al, calling into question the generalisability of their results (Brorson et al, 1998; O'Brien et al, 1989; Sando and Nahai, 1989).

Additional uncertainties constrain endorsement of liposuction at this time. The long-term fate of lymphoedema patients who undergo liposuction remains unclear. A small but promising cohort of lymphoedema patients treated with liposuction was followed for up to seven years without significant volume reaccumulation (Brorson, 2003). However, the drop-out rate and the limited size of the study restrict the generalisability of these isolated data. Patient and limb characteristics associated with positive and negative outcomes have not been reported. Hence, clinicians currently lack sufficient evidence to soundly judge patients' candidacy for liposuction. Uncertainty persists as to whether liposuction actually enhances patients' QoL or impacts other significant clinical endpoints. An unblinded, non-randomised comparison of lymphoedema patients that underwent decongestion

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therapy with (n=35) and without (n=14) liposuction suggests that 'arm volume-related' QoL dimensions may improve, though psychosocial QoL dimensions are unaffected (Brorson et al, 2006b).

Perhaps of greatest concern is the possibility that liposuction may inadvertently harm patients' residual lymphatics. Pathological scrutiny has yet to comment on this issue. A physiological pilot study of 20 patients encouragingly suggests that liposuction does not acutely impair lymphatic function (Brorson et al, 1998). Adequately powered studies with longitudinal follow-up and valid physiological endpoints are needed.

In the absence of large, prospective cohorts, definitive statements cannot be made regarding liposuction's long-term safety or clinical efficacy. A glaring need remains for innovations in lymphoedema treatment. Liposuction in its current or a future iteration may offer the lasting improvement that all lymphoedema patients seek. At this juncture, our patients deserve cautious, but open-minded pursuit of such promising options. AC

## Given the heterogeneity of lymphoedema patients, who should be offered liposuction? Are there particular patient characteristics that are relative or absolute contraindications to liposuction?

**RC:** Liposuction must be indicated for patients with a confirmed diagnosis of excess fat tissue, who have already had limited swelling reduction after several courses of combined decongestive therapy (CDT) and who are asking for further swelling reduction. However, sometimes after courses of CDT which achieve limited results, a further course of CDT can give positive results. It is necessary to allow time and to take a measured approach before deciding on liposuction.

We should also bear in mind that swelling reduction can be less important to the patient than an improvement in the function of the limb (Pain et al, 2003). At the end of the day this could be the final endpoint of any treatment, whatever the swelling reduction.

If a patient is non-compliant with compression therapy or hygiene requirements,

liposuction may be contraindicated. Some patients should also not be considered for plastic surgery because of their poor psychological state.

As in other indications for liposuction, the quality of the skin and its ability to retract after surgery are also important factors to consider:

**AW:** The successful outcomes reported by Brorson (2000; 2003) all pertain to groups of patients with moderate to severe arm oedema and hypertrophied adipose tissue. Conservative treatment had failed to produce a satisfactory result for these groups. It is said by the author that the most impressive results were achieved where the excess volume exceeded 1000ml. This may indicate that the patient with more severe lymphoedema, which does not improve with decongestive lymphatic therapy, could be helped through liposuction. However, this is not a cure and the lymphoedema must still be controlled following surgery.

Brorson (2000) described a rigorous approach to compression. It may be surmised that these patients were highly-committed to this post-operative regime, which required frequent monitoring, adjustment and replacement of the compression sleeves over the following year. Sleeves were worn 24 hours a day. Those patients who did not agree to this were not offered liposuction. Therefore, patient commitment and the ability to tolerate 24-hour compression are essential. However, a complete reduction maintained for at least seven years may be regarded as well worth the inconvenience.

**SN:** Most patients fall within the category of 'secondary' lymphoedema due to regional node surgery and or radiation therapy. A more broadened patient base would include the primary lymphoedemas, most often involving hypoplasia in paediatric patients or in long-neglected adult presentations. Other epidemic causes are linked to obesity, venous hypertension, sedentary lifestyle and dependency. Regardless of the underlying cause suggesting heterogeneity, a common thread within both camps is the decreased transport capacity of the lymph uptake and removal mechanism (mechanical insufficiency). Thus, it seems logical and rational to

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preserve and even enhance the residual function of the remaining intact lymphatic anatomy. By circumventing the disabled tissues and/or stimulating and training existing vessels and nodes to increase their workload, therapy provides a safe and effective strategy for improved lymphatic function. This logic has proven sound in tens of thousands of patient cases. Conservative, non-invasive strategies such as CDT have provided clinical outcomes that far exceed anything reported in literature, when compared to surgical interventions.

If our current outcomes were unremarkable, the rationale for invasive surgical procedures would be more acceptable and enjoy broader support. Lymphoedema, regardless of underlying cause, remains largely treatable with the systematic, conservative approach of CDT. No subgroup of lymphoedema patient is a better candidate for liposuction than the next. One must remember that invasive surgical procedures carry significant risks due to healing, haematoma formation, general anaesthesia, infections and, ultimately, irreparable damage to an already disabled system. The logic for removal of the tissue from the subcutaneous space via liposuction is inherently flawed since to extract valuable living tissue in an attempt to cosmetically reduce the limb swelling leaves the lymphatic system more compromised, and long-term management ever more difficult.

### **Does the current evidence base support integration of liposuction into standard lymphoedema management? If not, what additional data are needed?**

**RC:** Even if interesting results have been published, several factors need to be resolved before this technique is integrated into standard lymphoedema management, i.e.:

- ▶ There are still a number of questions about the side-effects that might occur as a result of liposuction which studies and long-term follow-up need to address. Also, surgeons may not be adequately qualified to perform the technique
- ▶ The length of time for follow-up after liposuction still remains unanswered. When looking at the published results (Brorson,

2001), we can see that in some cases volume reduction is achieved. If the rich deep vascular network near the fascia is modified, we can observe some atrophic changes in the connective structures. This can appear after total superficial lymphangiectomy, as we have already seen several times in our experience. Special care must be given to the very deep layer of subcutaneous tissue, where the important layer of vascular structures must remain safe

- ▶ Liposuction is only suitable for certain patients, and selection should not be based purely on clinical criteria, but also on dual energy X-ray absorptiometry (DXA) analysis (probably through segmental comparison of the normal limb and the pathological one: arm-forearm) in order to define accurately the area where there is an excess of fat, thus determining precisely where the surgery should take place. Other techniques could also be useful, such as ultrasonography and computed tomography [CT] scan.

Experience of using liposuction on lower limbs is still limited and people who have initiated this technique should carry out further trials.

**AW:** While Brorson's (2000; 2003) outcomes are impressive, other early work (O'Brien et al, 1989) is less encouraging. Although it appears possible to remove excess adipose tissue without further compromise to the superficial lymphatics, these successful results are from only one source. It would seem necessary for much more exploratory work to be completed before such surgery is regarded as standard treatment.

**SN:** No it does not. Dr Brorson's methodology has not been replicated on a large enough scale to prove its true efficacy. What is truly effective lymphoedema management? Even though a volumetric reduction is achieved during liposuction, the subcutaneous space has been forever altered leaving the limb at greater risk of infection, decreased fluid transport and exacerbation in the long-term. Lipo-lympho-suction has not been proven to provide comparable outcomes to conservative treatment.

We need to look beyond the visual impression of lymphoedema (limb enlargement) to the underlying and complete reality of the condition. Lymphoedema is not solely a cosmetic deformity, but a disease of lymph stasis and connective tissue hypertrophy due to a disabled protein/macromolecule removal apparatus. True treatment success must measure more than limb girth and any cosmetic improvement parameters. Most lymphoedema patients scrutinise the demands of self-management before drawing conclusions about overall treatment successes. CDT allows each patient to be treated in a tailored fashion. Skilled therapists can design a programme that works with the whole patient since limitations to compliance and success are unique to each person. In time, most lymphoedema patients can be liberated from intensive limb management, since with care and patience, swollen extremities where residual vessels and nodes remain intact enjoy improved function. As such, the patient is treated rather than the limb. Improvement in quality of life requires careful study and the benefit of daily contact with a skilled therapist. In comparison, the current outcomes for liposuction require lifelong 24-hour/day compression support with elastic garments. Many lymphoedema patients treated with CDT are weaned from 24-hour compression in the form of less nightly bandaging, which is of tremendous benefit to the patient.

### **Should patients with breast cancer-related lymphoedema be offered liposuction before undergoing conventional manual decongestion?**

**RC:** No, because treating lymphoedema with a course of CDT can achieve some improvement for the patient, both in terms of reduction in limb volume and quality of life. During this period it is possible to teach the patient about the key components of treatment: what lymphoedema means and what the well-known conservative techniques can do for the patient (following a programme of hygiene, the importance of compression therapy, the different decongestive therapies, such as self-massage, bandaging or pressotherapy that the patient can practice him/herself, etc).

**RC:** *Self-massage can bring some positive results, but the outcome will never approach the quality of treatment carried out by a well-trained physiotherapist.*

**AW:** *If more resources were to be channelled into early diagnosis and treatment, or even prevention, might it be possible to prevent the development of stage 2 lymphoedema?*

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It is important that CDT is carried out competently. DXA analysis has shown a relative decrease in the fat component of lymphoedema after CDT has been performed by a skilled and experienced healthcare practitioner over an adequate length of time (Cluzan, 2007).

**AW:** There may be some patients whose lymphoedematous tissue is so dense that there is little improvement with decongestive lymphatic therapy. However, it is to be hoped that treatment might be offered at an earlier stage.

Decongestive lymphatic therapy should ideally include manual lymphatic drainage (MLD) and compression on a daily basis, for at least two, but preferably four weeks (Casley-Smith, 1998).

The purpose of liposuction is to remove hypertrophied adipose tissue, whereas MLD aims to facilitate the action of the lymphatic system in removing protein from the tissues, and to encourage alternate drainage to a normally functioning region (Casley-Smith, 1998). It can also soften hardened tissues (Piller and Douglass, 2004). The published results of treatment by a combination of MLD and compression are variable, with a mean reduction of 50–80% being achieved for lymphoedematous arms and legs (Casley-Smith, 1995; Casley-Smith, 1998; Leduc et al, 1998; Hinrichs et al, 2004; Piller and Douglass, 2004). However, the greatest reductions are achieved in the early stages where the oedema is mild and the tissues still soft. My own experience suggests that lymphoedema can be totally reduced in stage 1; this is confirmed by Földi (1994).

Brorson (2000) found that his compression regime alone was successful in reducing stage 2 arm oedema by 50%, a far better result than that achieved by a standard sleeve. Given the effectiveness of this intervention, it might be pertinent to discover the efficacy of a course of decongestive lymphatic therapy, followed by a year of this compression regime, before considering surgery.

**SN:** Since preservation of the remaining lymphatic apparatus is crucial following breast cancer therapy, any such intervention would

prove illogical and cause manual therapy to yield less optimal results. Again, we must look at the far-reaching impact of lymphoedema (congestion of fluid, immune compromise and fibrosis) and also the quality of each patient's life. If management is customised and the long view leads to ever less intensive self-care, the typical patient will gain a sense of acceptance and optimism about the future. There simply isn't a place for liposuction as a pre-treatment to manual decongestion.

**Would enhanced lymphoedema screening and empiric compression therapy be a better use of our increasingly limited healthcare revenue than wider availability of liposuction?**

**RC:** Without comparative trials (which may be difficult to initiate) to compare the cost of this different approach of lymphoedema treatment to the other techniques available, it is far too early to answer this question.

However, a factor to consider when asking this question is the vast difference in skills and competency of the healthcare professionals who practice decongestive therapy.

CDT, performed correctly, seems at present to be the best answer to lymphoedema. In some countries, CDT may be difficult to get and swelling reduction (by whatever technique) can be difficult to obtain, but the cost of liposuction would be far too high in these countries. Self-massage can bring some positive results, but the outcome will never approach the quality of treatment carried out by a well-trained physiotherapist.

**AW:** The articles which describe liposuction for lymphoedema appear to suggest that these limbs were returned to an earlier stage, before the development of fibrosis and hypertrophied adipose tissue. If more revenue were to be channelled into early diagnosis and treatment, or even prevention, might it be possible to prevent the development of stage 2 lymphoedema?

Patients are often unaware that they are vulnerable to lymphoedema, and may not be vigilant, even after treatment for breast cancer.

There is a lack of data about the incidence following pelvic surgery or radiation, and these patients may be even less aware. Primary lymphoedema may also go unrecognised and untreated if bilateral and slow to develop.

Early treatment by decongestive lymphatic therapy has been found to be the most effective therapy. It has also been suggested that MLD alone may help to prevent the progress of latent or stage 0 lymphoedema (Piller and Douglass, 2004), or control it in the early stages (Leduc et al, 1998). Given that Pecking (1996) found that 96% of women who had treatment for breast cancer had pathological changes which predisposed them to lymphoedema, 100% of such patients could be regarded as being in stage 0. As well as advice about skin care, protection, exercise and weight control, the introduction of MLD and simple lymphatic drainage might be effective in reducing the incidence. Those patients who have experienced MLD appear to have greater understanding and skill in self-massage.

Ryan (2002) believes that the swollen ankle is a neglected condition. I have certainly found numbers of mainly middle-aged women with mild or even moderate lymphoedema of the lower legs who receive no treatment.

To suggest that these patients should receive treatment obviously has enormous resource implications for the already over-stretched lymphoedema services, as would more comprehensive or intensive management of post-cancer patients with a stage 0 or 1 lymphoedema. However, would the expansion of the service to include routine education of all vulnerable patients, and prophylactic or early intensive treatment, be more expensive in the long-term? When the cost of treating more severe lymphoedema, including liposuction, is considered, along with leg ulcers, cellulitis, depression, immobility, disability and unemployment, the converse might eventually be found to be the case.

**SN:** Absolutely. We have increasing evidence that early detection and intervention are the keys to halting the progression and reversing the existing clinical symptoms. Light elastic compression, correctly fitted, during the latency

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stage or stage one is a strategy which is currently being documented and with exceptional outcomes. Another strategy involves intervention with MLD to assist in training collateral circulation, since we must remember that most patients are endowed with reserve functional anatomy that can be recruited. When we understand that the lymphatic anatomy contains anastomotic connects between vessels and skin territories for the exact purpose of remediation of congestion, preservation of the intact system gives the body the ability to adjust to the stimulus of MLD, compression and exercise. Again, liposuction disregards this anatomical framework and seems to suggest that preservation of the residual anatomy is of no value.

### The diversity of outcomes reported in the literature suggests that the success of liposuction for lymphoedema may be highly practitioner dependent. Are all plastic surgeons qualified to perform liposuction for lymphoedema? If not, what qualifications should patients and clinicians look for?

**RC:** All medical techniques should be learned from well-trained practitioners. It would be far better for a plastic surgeon to spend time with a well-trained surgeon in the field of lymphology: every practitioner needs to have experience learned from the 'masters'. I would doubt the ability of a plastic surgeon to practice without meeting problems if simply following the recommendations written in some document of evidence-based medicine. I have seen several catastrophic situations after liposuction has been performed by surgeons who had no experience in lymphology.

Also, the patient must be aware of the importance of wearing strong elastic support after surgery and of having regular examinations by specialists.

**AW:** The most successful results are reported by Brorson (2000; 2003). However, it must be possible for this surgical technique to be replicated by others. I am unaware of any qualification which might indicate skill in treating lymphoedema. It is obviously necessary for prospective patients to be assured that a surgeon

is well-qualified, but they may also wish to obtain some data regarding success rates in reducing lymphoedema through liposuction.

It could be suggested that, although the skill of the plastic surgeon is an essential element, it is necessary for a team approach to be employed, as is usually the case in lymphoedema management. The surgeon would need to be working in collaboration with practitioners who were able to fit garments, and to advise and support the patient in the post-operative period.

**SN:** Even if all plastic surgeons are qualified to perform liposuction, the instruments developed by Dr Brorson are modified to cause less trauma. Also, the number of incisions and the placement of each are key to this more tailored approach. As such, additional special training would be required which is unlikely on any significant scale. Currently, I cannot rationalise liposuction for any segment of the lymphoedema population, since my clinical experience with several thousands of patients has proven that CDT works in all cases. Since CDT includes development of self-management skills while adopting a long-term view, even the most confounding cases can be dealt with more effectively than any singular surgical intervention.

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