Thieme

Lipedema – Myths and Facts Part 4

Lipödem – Mythen und Fakten Teil 4

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ABSTRACT

Lipedema is associated with numerous myths. In this fourth part of our series of articles we will examine the value of liposuction in the treatment of lipedema. We discuss the common statement amongst doctors who offer this procedure, that "liposuction leads to comprehensive and long-term improvement of lipedema". We have been able to show that there is a considerable gap between the often euphoric promises made by surgeons, and the current findings on liposuction. There are deficits in the quality and settings of many studies, deficits which lead to doubt with regards to these statements. There is a similar gap between the recommendations in the German S1-guideline for lipedema and actual practise, as performed on obese lipedema patients. The "critical indication assessment" recommended in the guideline is often not adhered to in patients simultaneously presenting with obesity and lipedema. It cannot be emphasised enough that liposuction is not a method to be used for treating obesity. Liposuction can however lead to an improvement in a patient's lipedema, but the correct selection of patients according to – medical – criteria is the decisive factor for therapeutic success. Liposuction should thus be embedded in a unifying concept which encompasses psychosocial, nutritional and sports medicinal aspects.

ZUSAMMENFASSUNG

Um das Lipödem ranken sich zahlreiche Mythen! In diesem vierten Beitrag unserer Artikelserie setzen wir uns mit dem Stellenwert der Liposuktion beim Lipödem auseinander. Wir diskutieren das von vielen die Liposuktion durchführenden Ärzten verbreitete Statement: „Die Liposuktion führt zu ausgeprägter und dauerhafter Verbesserung des Lipödems". Wir konnten zeigen, dass zwischen den oft euphorischen Versprechungen der chirurgisch tätigen Kollegen und der aktuellen Studienlage zur Liposuktion eine erhebliche Lücke klafft. Sowohl Studienqualität als auch Studiensetting weisen erhebliche Mängel auf, Mängel, die Zweifel an diesem verbreiteten Statement aufkommen lassen. Eine ähnliche Lücke klafft darüber hinaus zwischen den Empfehlungen der S1-Leitlinie Lipödem und der tatsächlichen „Absaugpraxis" bei adipösen Lipödempatientinnen. Die in den Leitlinien empfohlene „kritische Indikationsstellung" bei gleichzeitigem Auftreten von Lipödem und Adipositas findet kaum Gehör. Es kann daher nicht genug betont werden, dass Liposuktion keine Methode ist, um Adipositas zu behandeln. Gleichwohl kann die Liposuktion durchaus zu einer Verbesserung des Lipödems beitragen. Entscheidend für den Therapieerfolg ist die Auswahl der Patientinnen, die aufgrund – medizinischer – Kriterien erfolgen muss. Darüber sollte die Liposuktion in ein Gesamtkonzept eingebunden werden, welches psychosoziale, ernährungs- und sportmedizinische Gesichtspunkte berücksichtigt.

Introduction

This is the fourth part of our series of reviews on the myths that surround the disease of lipoedema. In these articles we cast a critical eye over popular statements about lipoedema, statements that appeared in scientific publications decades ago, statements for which proof of scientific evidence is still awaited. Many of these assertions – that have grown into dogma – have become common knowledge that is taken for granted among medical and also non-medical professionals, and this view has therefore also become common knowledge that is taken for granted among lipoedema patients and self-help groups.

In the first part of our series on lipoedema, we showed that the widely disseminated assertion that "Lipoedema is a progressive disease" has no scientific foundation; the frequently misused term "lipolymphoedema" (misused in order to make manual lymphatic drainage reimbursable) is therefore obsolete [1]. It is usually not the disease of lipoedema that is progressive, but often the disease of obesity. If both lipoedema and also lymphoedema are present in a severely obese female patient, this is therefore not "lipolymphoedema". On the contrary, the patient is suffering from three diseases that need to be addressed: morbid obesity, obesity-related lymphoedema and lipoedema [2].

In addition, our pilot study showed that the statement "Lipoedema causes mental illnesses" is also a myth with no scientific basis whatsoever. On the contrary, the results of our study show that a high psychological vulnerability on the part of the lipoedema patient contributes significantly to the development of lipoedema [1].

In Part 2 of our review, we focussed on the statement "Lipoedema is primarily an 'oedema problem', for which regular manual lymphatic drainage is therefore essential and represents the standard therapy". We showed that neither clinical, imaging nor histological evidence exists for 'oedema in lipoedema'. Hence, there is no indication for long-term and regular manual lymphatic drainage with the aim of removing the oedema [3].

In the third part of our series of articles on the myths of lipoedema, we discussed the sensitive topic of "Lipoedema and obesity" [4]. There are two particular statements that accompany our daily clinical work with lipoedema patients. First of all, the statement especially popular with patients that "Lipoedema makes you fat!" and secondly, the message spread by many lipoedema experts: "Weight loss has no effect on lipoedema!"

We showed that there is no scientific evidence for either of these two statements. There is no pathophysiological construct capable of logically describing – even approximately – why lipoedema should lead to a relevant increase in weight. Our many years of daily clinical experience point in the opposite direction: with the appropriate genetic predisposition for lipoedema, weight gain appears to be a significant trigger for developing this disease in the first place.

There are normal or slightly overweight patients with a greatly disproportional increase in adipose tissue and soft tissue complaints, but they form a very small minority in view of the overwhelming majority of adipose and morbidly obese lipoedema patients. Furthermore, there is neither robust data nor any empirical evidence for the widespread statement of liposuction-performing colleagues that weight loss does not improve lipoedema. Our clinical experience over many years indicates exactly the opposite. Permanent and significant weight loss (e. g. after bariatric surgery) leads to a marked improvement in symptoms; patients are often even symptom-free. In such cases, we then talk of a lipoedema in remission.

In this fourth part of our series of reviews on lipoedema, we focus on the significance of liposuction as a therapeutic option for lipoedema. We discuss the data on this operation that is so sought-after by many lipoedema patients and compare this data with the statements of colleagues who carry out liposuction. For this purpose, we enlisted the renowned plastic surgeon Prof. Nestor Torio-Padron, who has many years' experience of liposuction in lipoedema patients, into our team of authors.

Myth 6: Liposuction leads to a marked and persistent improvement in lipoedema

For many years, medical colleagues who perform liposuction have spread the message that liposuction is an effective and permanent treatment option for patients with lipoedema.

According to Schmeller, a well-known dermatologist at the Hanse Clinic in Lübeck, liposuction can cause "a significant, sometimes even spectacular improvement in body shape with a marked reduction or removal of the symptoms typical of the disease" [5].

His colleague Baumgartner at the same institution also believes in "the long-lasting effective improvement in findings and symptoms after liposuction for lipoedema" [6].

Similarly, Rapprich, a colleague who carries out liposuction in Bad Soden, has written: "Several studies have demonstrated the effectiveness in terms of symptom improvement" [7].

Cornely, a dermatologist from Düsseldorf, with a strong presence particularly in the internet media, wrote in this journal: "Surgical treatment, undertaken as lymphological liposculpture, is a causal treatment for lipoedema of the arms and legs; it is permanent and cures the clinical picture" [8].

This positive – one could say almost euphoric – attitude to this surgical procedure is also reflected in the current German lipoedema guidelines. However, it is important to know that these guidelines are S1-guidelines and represent the lowest level of evidence of all; i. e. these guidelines are a recommendation for action from "designated" experts – on the basis of an informal consensus and not because of adequate data [49].

These guidelines state that liposuction "leads to marked improvements in spontaneous pain, tenderness, the tendency to develop oedema and bruising, with significant differences pre- and postoperatively. It results in a reduction in conservative treatment and sometimes even removes the need for treatment. In the majority of cases, the improvements last for many years" [9].

We now wish to devote ourselves to three aspects that are closely linked to these statements. The first aspect examines the studies on the effectiveness of liposuction. Are these statements published by the protagonists of the German liposuction scene supported by robust data? The second aspect focuses on the term "permanent" with which the effect of liposuction is readily advertised. The third aspect discusses the mostly taboo second disease in lipoedema – namely obesity.

Aspect 1: Studies on the effectiveness of liposuction

What is, then, the scientific evidence for these statements? Do robust data exist that confirm these ambitious declarations?

The S1 Guideline Lipoedema cites the studies of the above-named authors Schmeller, Baumgartner, Rapprich and Cornely as the source for the above-mentioned statement. Three of these four authors (Schmeller, Rapprich and Cornely) are also compilers of this guideline. Furthermore, these guideline authors (with the exception of Schmeller!) frequently refer to the respective other colleagues in order to illustrate the value of liposuction [7, 8, 10–12].

However, if one looks in detail at the publications of the colleagues, there are considerable differences in assessment of the success of liposuction.

For example, an article by Cornely in this journal states: "Lipoedema has become curable" [10]. He regards two of his own publications as an adequate source for this ambitious statement. In a further publication, Cornely affirms this declaration and says "It is clear that even with large numbers of cases of our own patients, as was already published in 2004, the postoperative need for further lymphatic drainage and compression is zero" [12].

However, no proof for this – possibly – momentous statement can be found either in the article by Cornely himself or after a thorough search of the literature by ourselves.

In his "Cologne Lipoedema study" published in 2014 (together with Gensior), Cornely summarised his study results as follows: "Since 1997 the disease can be virtually cured by surgery. 'Cured' is understood to mean that complex decongestion therapy to treat the disease is no longer required. The success rate on long-term observation of 15 years is 97 %" [12].

In a reader's letter to the journal LymphForsch 2015, Schmeller dissected this study by Cornely into 30 individual parts and concluded "that some of the figures listed in this paper are incorrect and, from a statistical point of view, meaningless; most of the results are not reproducible and in addition, even obviously false. It is also not – as the title suggests – the results of a study carried out according to scientific criteria, but merely – sad to say – a very poorly conducted 'survey'" [13].

It appears remarkable to us that in addition to the disastrous quality of this study, such a complex clinical picture as lipoedema – a disease in which the quite obvious factors such as weight gain (mostly obesity) as well as psychological and sociocultural influences play an essential role [1, 3, 4] – can be "cured" solely by a surgical measure such as the suctioning of adipose tissue. In our view, this purely surgical perspective does not do justice to the complexity of the disease of lipoedema.

Rapprich has a clearly different therapeutic approach. He states that "Liposuction, together with the pre- and postoperative complex physical decongestion therapy, a sports programme and treatment of concomitant obesity, as well as any necessary psychological support, is an effective therapeutic concept" [7]. The colleague from Bad Soden goes even further and writes: Liposuction "can only be successful in combination with these other therapies" [7].

Rapprich apparently recognises lipoedema as a multifactorial disease and liposuction as one of several therapeutic building blocks within a comprehensive, holistic concept. In his paper cited in the guideline, only 16 % of patients still required compression therapy after liposuction [11]. In his more recent study published in 2015, Rapprich also reported that the majority of patients no longer required conservative treatment after liposuction (he probably means complex physical decongestive therapy, CPD): "Conservative treatment can be avoided in the majority of patients" [7]. Rapprich does not quote any actual figures in this study.

Rapprich is the only author to address the question of how far liposuction can reduce the volume of the treated extremity. In his study [11] he measured the volume before and after the operations using a 3D simulation programme. He was able to show a relative volume reduction in all 25 patients of between 0.9 and 19.8 %. In the discussion of his results, Rapprich himself commented that the main limitation of his study was the time of follow-up. Patients were examined and volume determined as soon as 6 months postoperatively. That is undoubtedly too short a time for a study investigating the effectiveness of an operation in relation to an improvement in preoperative symptoms and a permanent reduction in pathological adipose tissue.

In 2010, Schmeller published the results of a single-centre retrospective study in which 112 patients underwent liposuction for lipoedema and were examined on average 3 years and eight months postoperatively [14]. In his paper, he not only talks about the successful removal of the circumscribed and often disfiguring increase in adipose tissue, but also of a reduction in the oedema typical of the disease and a decrease in spontaneous pain, tenderness and the tendency to bruise. According to Schmeller, this led to an improvement in mobility, cosmetic impairment and quality of life. In 2014 Baumgartner and Schmeller [15] published the results of a second single-centre retrospective study that are supposed to have confirmed the results of the study published in 2010 over a longer time period. In addition, attention was to be paid to the need for conservative treatment (manual lymphatic drainage and compression therapy) postoperatively over a longer period. According to the two authors from Lübeck, liposuction led to "complete freedom from symptoms in only about a third of patients". In the 2010 study, 77 % of patients still required CPD after liposuction and in the study published in 2015, 70 % were still receiving CPD (albeit fewer in percentage terms than before liposuction).

Of all the published studies that investigated the efficacy of liposuction in the treatment of lipoedema, those by Schmeller and Baumgartner are the ones of the highest quality. Nevertheless, both papers have similar limiting factors and are thus not sufficient for adequate scientific evidence of the published data. Both studies were retrospective and single-centre. This type of study is low down in the pyramid that is supposed to represent the degree of medical evidence and belongs to those studies with a low level of evidence [16].

If the above data of Cornely, Rapprich, Schmeller and Baumgartner are considered one after another, then the "success rate" of liposuction treatment (defined by Cornely as no further need for CPD postoperatively) with variably long follow-up (6 months to 15 years) is as follows:

- Cornely 97 % with a reported 15 years of follow-up
- Rapprich 84 %, however with continuation of any psychological support and dietary advice, with only 6 months of follow-up
- Schmeller 23 % after 4 years of follow-up
- Baumgartner 30 % after 8 years of follow-up

However – and this should also be emphasised – the above-mentioned criterion for a cure defined by Cornely can be seriously questioned. On the one hand, lipoedema patients do not require regular manual lymphatic drainage anyway (i. e. even without liposuction) [3]. Nevertheless, even though patients still have to wear compression stockings after liposuction, they appear to experience an improvement in their symptoms, i. e. also an improvement in mobility. Therefore, in our opinion, this criterion would be a more logical parameter of success.

We now turn to the psychological factors of importance when evaluating the success of liposuction – factors that have hitherto not been considered in any of the studies discussed here.

From a psychological perspective, there are two key questions:

Firstly: Is liposuction really what is effective? In other words, is the success of treatment measured by the investigators actually attributable to the liposuction or are there other factors at work that contribute to this measured success?

Secondly: What was actually measured with the questionnaires used? Or to put it another way: do the questionnaires used really measure the success of liposuction treatment?

If we examine the first question: Is liposuction really what is effective?

To address this question it should be recognised that many lipoedema patients have experienced a long and painful journey until their disease was recognised and they were then eventually treated by liposuction. The patients have often had to fight the health insurance schemes to get them to pay for liposuction. Others have saved long and hard to make their dream of liposuction a reality. The expectations built up for this treatment are highly relevant for answering our question.

Can the high commitment of patients in advance of liposuction – as well as the expectation that the lipoedema will be cured – contribute to the patient's own perceived success of treatment?

Placebo research provides an indication of whether high expectations affect an improvement in symptoms.

A study on the pharmacological and placebo-analgesic effect of the opioid remifentanil investigated how patient expectations influence the effectiveness of a treatment [17]. All subjects completed several consecutive conditions of open or blinded administration by infusion. Over the course of the study, subjects were then told that administration of the analgesic would be stopped. In fact, the opiate was continued, but this announcement had a considerable effect on the pain perceived by the subject. In the expectation that the drug would no longer be given, the pain scores increased – despite continued administration – until they almost reached the baseline level without analgesic.

This gives not only an indication of the enormous effect of expectations created by the treatment-giver, but also of the effect of communication by a physician.

In terms of the success of treatment by liposuction, the question then arises of what expectations are aroused by the physician in the information given to lipoedema patients – and what effects do these expectations have on the pain experiences of patients after liposuction?

The effect of surgical procedures compared to sham operations was investigated in another placebo design study. Shivonen et al [18], compared arthroscopic partial meniscectomy with sham surgery in a multicentre, blinded and randomised controlled study. Remarkably, both groups of patients – i. e. also those who had only a sham operation – reported a marked reduction in knee pain – even after one year.

After examining 6 studies of good methodological quality, a review by Louw of randomised controlled studies with placebo operations in the field of orthopaedics concluded "that sham surgery in orthopedics was as effective as actual surgery in reducing pain and improving disability" [19].

So what conclusions can be drawn from this for the research undertaken to date on the effect of liposuction?

According to the results of placebo research, for an unequivocal determination of the true effect of liposuction, a second control group is needed in addition to an untreated control group. However, unlike the orthopaedic procedures described above a sham liposuction operation cannot be performed because the – visible – difference in body shape is a significant partial aim of the liposuction (not to mention ethical aspects of the required study design that could probably not be justified).

Instead of a placebo design that differentiates between the effect of patient expectations and the real effects of liposuction, at least a study design comparing the effects of liposuction with those of another therapeutic approach would be necessary. Different treatments would be compared with each other and also with an untreated group. A comparison between physiotherapy and psychotherapy [20] focussing on the improvement in fitness and the boosting of self-esteem and then comparing them with liposuction in a study lasting several years would be logical. A good methodological design would then compare three groups with each other: one group of lipoedema patients without liposuction (baseline), one group given liposuction and another given the above-mentioned conservative treatment concept.

As regards the second question from a psychological perspective: did the questionnaire used by the investigators really measure the success of liposuction?

The studies on liposuction conducted so far used self-drafted lists [e. g. 21], none of which meet the quality criteria of questionnaires. Very wide areas were recorded in both a generalised and a one-sided symptom-oriented manner: e. g. "mobility impairments", "cosmetic impairment" or "impairment of the quality of life". This easily leads to a distortion of answers. Thus, the response to previous questions generally has an effect on the response to subsequent questions [22]. Women, who first estimate the spontaneous pain in their legs, the tenderness in their legs and the feeling of heaviness in their legs and their limitations on walking (due to their legs), may well subsequently assess their dissatisfaction with their legs rather than the actual impairment of their quality of life in general.

Furthermore, a study of good quality is required to clarify the question of the efficacy of liposuction. Somatic comorbidities and their development also need to be recorded to enable improvements or deteriorations to be interpreted. Of outstanding importance is a record of relevant psychological symptoms such as depression or anxiety [23] that can intensify pain and which it is imperative to take into consideration [23]. In all areas, self-assessments (e. g. patient questionnaires) must be supplemented

by third-party ratings by diagnosticians – who are independent of the treatment-givers – or by objectively measured data.

Conclusions about currently available studies

It is obvious from summarising the studies on the effect of liposuction on the disease of lipoedema that nowhere near adequate evidence for the above-stated ambitious statements of the protagonists of liposuction yet exists. This is also the view of the Federal Joint Committee (G-BA) who, in November 2017, decided that outpatient liposuction is not a standard benefit of German statutory insurance schemes (GKV). In the opinion of the G-BA, "The potential bias of the studies is, however, so great that the results are to be interpreted only with caution". The G-BA concluded that "The benefits of the method "Liposuction in lipoedema" are not yet adequately proven" [24].

This assessment was meanwhile also confirmed at the highest level by the German Federal Social Court (BSG) in April 2018. The case had been brought by a female patient with lipoedema who had undergone several liposuctions as an inpatient. The judges ruled that liposuction did not meet the requirements of quality and cost-effectiveness of the GKV. The long-term effectiveness of the method had also not been adequately confirmed [25].

Nevertheless, the G-BA stated that liposuction could certainly have the "potential of a necessary alternative treatment" [24]. The G-BA will therefore support a study to improve the state of knowledge. With the help of this investigational study, it is hoped to provide clarity about the value of liposuction in lipoedema.

The reaction of lipoedema self-help groups was not long in coming. Shortly after the judgement of the BSG, the internet lipoedema portal, popular and frequently visited by lipoedema patients, headlined the story thus: "Damning verdict on liposuction". In the view of the portal, "The judgement amounted to a veritable catastrophe for most lipoedema patients" [26]. Apart from the fact that liposuction is in any case only suitable for a small group of patients (in the majority of patients with lipoedema, the overall symptom picture is actually dominated by true obesity [4]), the decision of the court and that of the G-BA could generously be interpreted as protection for patients against surgical procedures for which proof of an effective and long-lasting efficacy has not yet been produced.

Aspect 2: Liposuction has a permanent effect

In addition to the problematic quality of the studies on the success of liposuction, we would like to discuss in more detail two other aspects of this operation that is currently so widely propagated via various channels.

Liposuction has a permanent effect, "Adipose tissue once removed does not return". That is what Heck and Witte, two surgeons from Mühlheim on the Ruhr promise, who, according to their own figures, perform more than 1000 liposuctions per year. In 2018, an article appeared that stated "Recurrences are generally not observed". This outcome was based on the "extremely efficient decongestion of the tissue by the operation". Heck and Witte therefore described their liposuction as "lipo-decompression" [27].

This concept of the "congested adipose tissue" can also be found in the work of Cornely, who bases the tenderness of the tissue on an "overproduction of lymph in the arms and legs" and understands his "lymphological liposculpture" as "causal treatment of lipoedema" [10]. As we already discussed extensively in Part 2 of "Lipoedema – myths and facts", there is not a shred of scientific evidence for this remarkable pathophysiological construct [3].

Terms such as "lymphological liposculpture (Cornely) or "lipodecompression" (Heck/Witte) should therefore be regarded less as scientifically-based and more as marketing-promoting terms.

But the above-mentioned protagonists of the German liposuction scene and the lipoedema guidelines also stress the sustained nature, the "permanent" effect of this procedure.

Schmeller for example, is convinced that liposuction "not only achieves a permanent improvement in the body shape, but also reduces the symptoms" [28]. Rapprich also believes that "a permanent reduction in lipoedema is only possible through liposuction". [29]. Baumgartner writes: "The durability of the effect of liposuction over so many years is all the more remarkable in comparison with CPD" [15].

For Cornely, lymphological liposculpture (he means liposuction) is "a causal therapy for lipoedema of the arms and legs; it is permanent and cures the clinical picture" [10].

As to be expected, this view is also found in the S1 Guideline on lipoedema, since three of these four authors are members of the guideline committee (Baumgartner, the fourth author quoted, works – like Schmeller – at the Hanse Clinic in Lübeck).

The German lipoedema guidelines contain the following statement "Liposuction is used for permanent reduction of the pathological subcutaneous tissue of the arms and legs" [9].

Aside from the previously discussed deficiencies in all the study settings which lead to doubts about this "permanent success" of liposuction, there are further questions that need to be addressed in this connection.

By far the largest proportion of patients with lipoedema is obese. We already mentioned the numbers in Part 3 of our series of articles "Lipoedema – myths and facts" [4] and will just repeat them briefly here: 88 % of our lipoedema patients whom we saw as outpatients in the Földi Clinic in 2015 were obese; lipoedema centres in England and the Netherlands have published similar figures [30–32]. Even in a patient collective who had undergone liposuction by Wollina and Heinig in Dresden, 65 % of the patients were obese, 35 % were even morbidly obese, i. e. had a BMI of 40 kg/m^2 and higher [33].

This coexistence of lipoedema and obesity appears to be a sort of taboo subject among colleagues who carry out liposuction. In the above-mentioned study by Wollina and Heinig entitled "Tumescent microcannular (laser-assisted) liposuction in painful lipedema", the comorbidities of the patients who underwent liposuction were listed. Apart from the fact that "painful lipedema" is a pleonasm (like white mildew) – because if lipoedema causes no symptoms, it is by definition not lipoedema but at most, lipohypertrophy – something else is striking when reading the article. When listing these concomitant diseases, the Dresden colleagues state: "The most common comorbidity observed was arterial hypertension (n = 13) followed by chronic venous insufficiency (n = 9). Central body obesity was evident in four patients". However, if the BMI of the liposuctioned patients of Wollina and Heinig is considered, then it is evident that 17 of these 26 patients were obese (i. e. had a BMI of 30 kg/m^2 or more), 9 were even morbidly obese (therefore

had third-grade obesity with a BMI of 40 kg/m² or higher). Even if the BMI of patients with lipoedema has weaknesses at least in the overweight and slightly obese range (where the waist-to-height ratio is more meaningful), it can be assumed that lipoedema patients with a BMI of 35 kg/m² or higher will also have abdominal obesity. In the study by the colleagues from Dresden, this would be the case in 12 (out of 26 patients). Obesity was thus not even recorded as a comorbidity. In our experience, this apparent "obesity blindness" is also shared by many lipoedema experts and was already discussed in Part 3 of our series of articles "Lipoedema – myths and facts".

A review of the literature of the German protagonists of liposuction reveals a different view only in a statement by Frambach from the Hanse Clinic in Lübeck, who considers that obesity in lipoedema patients is a significant aggravating factor in the pathogenesis of lipoedema. She writes: "Obesity is the most common concomitant disease in lipoedema. In addition, overweightness and obesity obviously constitute an aggravation factor. This means that increasing body weight not only intensifies the manifest appearance of the extremities, but generally also the symptoms" [34].

We completely agree with this assessment of Frambach, which exactly reflects our daily experiences in clinical practice with lipoedema patients.

In our view, the acknowledgement that obesity is an aggravating factor of lipoedema is of outstanding significance – and is completely underestimated by many colleagues who undertake liposuction. It is precisely the course of body weight after liposuction that deserves special attention and which leads to the following questions:

How does the weight of patients diagnosed with lipoedema who have undergone liposuction change with time?

Were the patients investigated in the above-mentioned studies, in whom colleagues who carried out the procedure confirmed a "permanently" successful treatment, able to maintain their weight for the duration of follow-up after liposuction?

Did the patients who underwent liposuction really not experience any increase in weight over the ensuing years (in the case of Cornely, 15 years, Baumgartner 8 years, Schmeller 4 years and with Rapprich only 6 months)?

None of the quoted studies give any information about the course of body weight; none of the above-mentioned guideline authors state the BMI of the patients investigated. Only in an earlier study by Schmeller et al., was the course of weight also recorded – and here the authors found a "contrary tendency": a larger group had lost weight after liposuction, a smaller had gained weight and no information was given for a third group (almost 30 %). However, the investigators themselves pointed out the limited value of these figures since "the weight information in the questionnaires could not be checked" [48]. These figures are, however, essential because the so frequently quoted "permanent improvement in findings" could only be expected if weight remained largely stable in the lipoedema patients who had undergone liposuction. All experience shows that a weight increase, as also observed by Frambach, would lead to an increase in symptoms.

Long-term stability of body weight in the majority of lipoedema patients would, however, contradict our many years of experience with this group of patients. Many patients with this diagnosis exhibit a constant increase in their weight through the years. Everyone who treats lipoedema patients knows the relevant history of body weight and knows the tales of woe about weight gain that was merely interrupted by diets with a subsequent yo-yo effect. Our daily clinical observation of our own patients is also confirmed by numerous studies on the progression of obesity in the USA. This progression of body weight can be observed both for the entire population of a country and also between individuals. Whereas obesity experts have spoken for years of an obesity epidemic, at the same time an "individual" increase in weight in people with an initially normal weight is being observed [35–39].

Why should this individual weight gain in lipoedema patients, whose weight has often varied greatly for many years, be stopped after liposuction?

What happens with patients who have undergone liposuction and then put weight on again afterwards? Is there a renewed increase in adipose tissue in the liposuctioned area and hence also an increase in symptoms typical of lipoedema?

These are questions that neither the guideline authors as a whole, nor the above-named protagonists of the German liposuction scene, provide an answer.

During the course of our clinical work, we regularly see patients diagnosed with lipoedema who have undergone liposuction. These patients come to the Lymphology Outpatient Department or are even admitted to the Földi Clinic, because they have symptoms typical of lipoedema. (Symptom-free patients after liposuction naturally do not seek medical help). Almost all women report a transient improvement in symptoms after liposuction. However, almost all these women (whom we see) have experienced a renewed gain in weight after liposuction – and therefore also a worsening of soft tissue pain in the leg region.

This increase in adipose tissue after liposuction was also observed in a prospective randomised, controlled study by Hernandez and Eckel of the University of Colorado in Denver [40]. In this – at least in the USA – highly regarded study (that was also commented on in the New York Times [41]) normal-weight patients who had undergone liposuction showed a renewed increase in the adipose tissue removed by liposuction within one year. "We provide strong evidence that adipose tissue is, indeed, restored to the baseline level when it is removed surgically" [40]. The authors of this study also provide information about which regions of the body were particularly affected by the increase in adipose tissue: "Fat re-accumulated preferentially in the abdominal region …and more slowly in the hip and thigh region" [40]. In this study, the renewed increase in adipose tissue was demonstrated both in visceral as well as subcutaneous depots "fat re-accumulated in both the visceral and subcutaneous depots" [40].

Conclusions about the aspect: "Liposuction has a permanent effect"

In summary, this prospective, randomised, controlled study suggests that

1. Within a year, the weight of suctioned adipose tissue (body fat) will increase,

2. The cosmetic effect on the thigh after one year (in this normal-weight study population) will persist – but here too, an increase (not yet significant) in adipose tissue will occur in the operated legs,
3. There will be an increase in predominantly visceral fat in the abdominal region that is known to be associated with an increased cardiovascular risk.

Dr. Felmont F. Eaves, a plastic surgeon and former President of the American Society for Aesthetic Plastic Surgery described the study as "very well done" and declared that in future, his patients would be informed of these risks before planned liposuction [41].

Finally, according to Anne Peled, a plastic surgeon from San Francisco, who is widely regarded also beyond the USA: "The avoidance of postoperative weight gain is essential in order to maintain the results of surgery" [42].

Aspect 3: Obesity

In our view, one of the least sensible recommendations of the S1 Guideline Lipoedema concerns the maximum weight that patients with lipoedema should have prior to liposuction. This section states:

"Surgeons experienced in liposuction advise strict selection in patients with a body weight > 120 kg (Schmeller 2014) or a BMI > 32 kg/m^2 (Richter 2013). A concomitant morbid obesity should be tackled therapeutically prior to liposuction" [9].

A long-term BMI of around 32 kg/m^2 that is stable prior to liposuction, also appears to us a sensible limit for medically indicated liposuction. This case guarantees that the obesity – in relation to the disease of lipoedema – is not the main focus. However, we do not agree with the verdict of Schmeller for a limit of 120 kg. The quotation of a weight without consideration of the height appears totally unsuitable to us for assessing which of the two diseases – obesity or lipoedema – is the more significant. A patient with a height of 1.65 meters and a weight of 120 kg has a BMI of more than 44 kg/m^2. Or, to put it another way: with a weight of 120 kg the patient would have to be over 1.93 meters in order to have a BMI of 32 kg/m^2 – and female lipoedema patients in our practice who are as tall as that are extremely rare! In our opinion, with a patient 1.65 meters tall and weighing 120 kg (and hence with a BMI of more than 44 kg/m^2) it is not the lipoedema (and hence the liposuction) that is the priority, but the morbid obesity. This is often closely associated with metabolic, cardiovascular and orthopaedic concomitant diseases. In our view, the indication for bariatric surgery should be examined instead of liposuction. We discussed the success of bariatric surgery in also influencing the lipoedema in Part 3 of our series of articles on lipoedema.

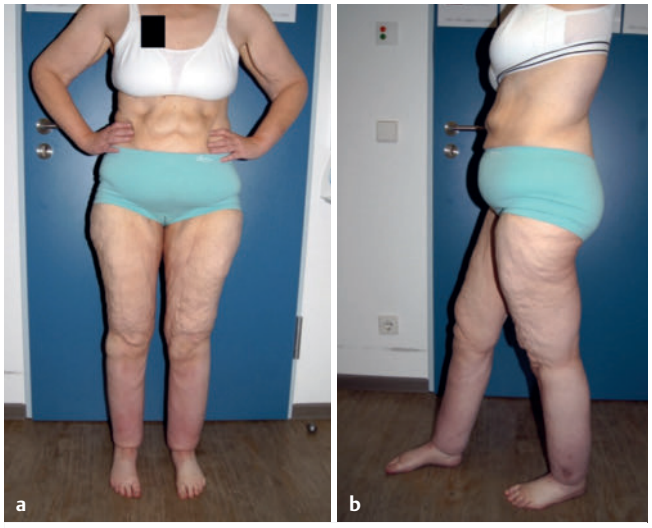
Nearly every week in our clinical practice we see that the recommendation in the S1 Guideline Lipoedema for a "strict selection" of patients if the BMI is over 32 kg/m^2, is merely smoke and mirrors. We regularly see severely obese patients who come to us with the intense desire for liposuction. Equally regularly, we also see however, that these morbidly obese patients have received an expert report from colleagues who practice liposuction, stating that liposuction is the only helpful option; patients with a BMI of 40, 50 or 60 kg/m^2, patients whose report gives the diagnosis of lipoedema, but not the diagnosis of obesity. This approach is also clear in the already quoted investigation of Wollina and Heinig from Dresden. 35 % of their liposuctioned patients were morbidly obese, i. e. they had a BMI of 40 kg/m^2 and higher; the heaviest patient had a BMI of 61.8 kg/m^2! [33]. In our opinion, this is way beyond the "strict selection of patients" stipulated in the lipoedema guideline. In our experience, the recommendation in the guidelines that morbid obesity accompanying lipoedema should be "tackled therapeutically prior to any liposuction" [9], falls on deaf ears among many of the colleagues undertaking liposuction. In the previously discussed studies of Rapprich, Cornely, Baumgartner and Schmeller – which also form the main basis for the lipoedema guidelines – there is no precautionary mention of the BMI of the liposuctioned patients.

▶ **Fig. 1** Patient who attended a large German dermatology clinic (specialising in the treatment of lipoedema).

▶ **Fig. 1a** and ▶ **Fig. 1b** show a patient who presented herself at a large German dermatology clinic (specialising in the treatment of lipoedema). Here only "lipolymphoedema syndrome of the legs and arms" was diagnosed – a diagnosis that should in any case be regarded as obsolete, because there is no logical pathophysiological concept for it [1, 2]. Although the body weight of 147 kg and the height of 165 cm were recorded, the term "obesity" is entirely absent from the full report of the dermatologist advocating liposuction [43]. However, in reality, obesity is the predominant disease in this patient, Grade 3 obesity with a BMI of 54 kg/m^2. The patient also suffered from concomitant diseases that were closely linked to the morbid obesity. Diseases such as obesity-associated lymphoedema of the legs, arterial hypertension, reflux disease, chronic venous insufficiency with a history of venous leg ulcer on the left leg – and also lipoedema

The assessment of the dermatologist at the dermatology clinic reads as follows: "In summary, the present findings are consistent with an abnormal condition of the body for which liposuction is indicated". [43]. The colleague proposed 7 sessions of liposuction at a total price of 18,228 euros!

In our opinion, this assessment makes little sense either from a medical or an economic point of view. After this report by a dermatological expert, the same patient then sought a second opinion in our Specialist Lymphology Clinic (Földi Clinic). We were able



▶ **Fig. 2** Patient from ▶ **Fig. 1a** and ▶ **Fig. 1b**, 14 months after gastric bypass surgery.

▶ **Fig. 3** 36-year old patient with lipoedema (BMI 30.5 kg/m^2), who reported continued pain in the leg region despite conservative treatment; **a** Before liposuction, **b** After liposuction by Prof. N. Torio.

to convince the patient that the proposed liposuction would not achieve any significant and certainly not a permanent improvement and that bariatric surgery – embedded in a long-term overall concept – was the better alternative treatment. The patient agreed with our opinion and was prepared for a gastric bypass operation within the context of our multimodal obesity programme. Surgery was performed a few months after discharge from the Földi Clinic.

▶ **Fig. 2a** and ▶ **Fig. 2b** show the same patient 14 months after the gastric bypass. The long-term effect of this treatment concept has already been demonstrated in many studies [e. g. 44–47]. The patient's weight has almost halved and is currently 76 kg. The leg circumferences of originally 21 litres per leg have now more than halved to 10 litres. This has given the patient both a considerable improvement in her obesity-associated lymphoedema and also in the other concomitant diseases. The antihypertensives could be stopped and there are no longer any symptoms of reflux. In her own words, the patient has been able to "get her life back". Under compression treatment with flat-knit compression stockings (that still have to be worn because of the lymphoedema) the patient is symptom-free also in terms of the preoperative soft tissue leg pain typical of lipoedema. After her weight has remained stable for approx. one year, then a plastic surgical procedure to remove the excess skin of the thigh (possibly also of the abdomen) would be medically indicated.

Conclusions about the aspect of obesity

Liposuction is not a therapeutic option for treating obesity. We therefore consider disregarding the diagnosis of obesity in obese lipoedema patients as unhelpful. To us it appears essential to take obesity – as the most common comorbidity in lipoedema – into account in order to offer the best treatment to patients with lipoedema.

Final assessment

Despite a lack of clear study data, we believe that liposuction nevertheless has a place in the treatment of lipoedema. We, too, see patients who have experienced a marked improvement in symptoms after liposuction. The Federal Joint Committee also sees the potential of this operation. However, it should be carried out under clearly defined conditions – both on the part of the lipoedema patient and also on the part of the surgeons. To this end, we propose the following criteria for discussion:

Criteria concerning the lipoedema patient

1. Pain in soft tissue must have persisted despite conservative treatment that has been carried out for at least 6 months.
2. Liposuction must be incorporated into a comprehensive therapeutic concept that also considers psychological, psychosocial, dietary and sports medicine aspects.
3. In the case of obese patients with lipoedema, then of the two diseases, obesity must not predominate. In our view, this would be the case if the BMI of 32 kg/m^2 named in the lipoedema guidelines was exceeded. Exceptions to this should be justified.
4. In order to reduce the risk of a postoperative weight increase (that would negate the improvement achieved through liposuction), proof is needed that the weight has been largely stable for at least 2 years.
5. A preoperative psychological assessment by trained professionals must have been conducted to exclude eating disorders or severe psychological diseases that would stand in the way of a permanently successful treatment.

Criteria concerning the surgeon:

1. Definition of quality standards that the surgeon must meet.
2. Certification to ensure this quality standard – similar to that which also exists for surgeons carrying out bariatric-metabolic operations. The patient would then have the possibility of finding a surgeon who meets the defined quality criteria.

▶ **Fig. 3a** and ▶ **Fig. 3b** show a patient with lipoedema (BMI 30.5 kg/m^2) who continued to report pain in the leg region despite conservative treatment. After liposuction with the removal of 3 litres per leg (thigh and knee region), the patient was symptom-free under

the consistent wearing of compression stockings. With maintenance of body weight, results have now been stable for more than 2 years.

CONCLUSIONS

We believe that selection of suitable patients as well the incorporation of liposuction into a holistic treatment concept is decisive for the success of liposuction. This concept should take into account the entire range of symptoms of the patient with lipoedema: the pain as well as problems of self-acceptance, any psychological diseases and the problem of weight gain.

Conflict of interests

The authors state that there is no conflict of interests.

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