

Last updated on 22 July 2026

Consensus Paper from the Second International Conference on ‘Lipedema’ in Vienna, Austria,
18 October 2024

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Kommentiert [lh2]: leave first en second author in place, the others in alphabetic order

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BACKGROUND

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Known since 1940 as 'lipoedema of the legs', this condition is increasingly well understood. Lipoedema, also known as lipohyperplasia dolorosa (LiDo), affects all the limbs in women and is a chronic disorder of the adipose tissue. It is not oedema, lymphoedema or obesity. Its cause is genetic. Global studies estimate the prevalence at 10 per cent.

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OBJECTIVE

To provide an update on the first 'International Consensus Conference on Lipedema 2017' and the second international consensus conference on lipoedema (LiDo), in order to review European guidelines and the specialist literature, including the long-term benefits of lymph-preserving liposuction for lipoedema under tumescent local anaesthesia.

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METHODS

International experts on lipoedema (LiDo) were invited to the Lipoedema Congress held from 16–19 October 2024 in Graz and Vienna, Austria. The second LIPOEDEMA CONSENSUS MEETING took place on 18 October 2024 in Vienna. Expert opinions are important, as there is only limited evidence-based data on lipoedema (LiDo).

RESULTS:

There is an urgent need for a reliable test to reduce diagnostic uncertainty. Lipoedema (LiDo) can only be diagnosed in the presence of pain. The condition must be distinguished from painless fat disorders. All evidence points to a biological origin triggered by the lymphatic system, without psychological causes. Compression therapy remains an important conservative treatment, particularly in post-operative care. An evidence-based approach to diagnosis and treatment can improve outcomes for patients and alleviate the burden on the healthcare system. Liposuction significantly reduces limb circumference and symptoms. It is important to use an atraumatic technique to avoid damage to tissue and lymphatic vessels.

CONCLUSION:

Lymph-preserving liposuction with tumescent local anaesthesia is currently the only effective treatment for lipoedema (LiDo).

Kommentiert [lh9]: Introduction

An international consensus conference on lipoedema took place as part of the Second International Congress on Lipoedema. This congress was organised by the Austrian Academy of Cosmetic Surgery and Aesthetic Medicine (AACMS) and the International Society for Dermatologic Surgery (ISDS), and took place from 16 to 19 October 2024 in Graz and Vienna, Austria. The following individuals took part in the consensus conference held on 18 October 2024 in Vienna:

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Prof. Cornely (D), Dr Barsch (A), Prof. Brenner (A), Dr Faerber (D), Dr Hanke (USA), Dr Halk (NL), Dr Sandhofer (A), Dr Wright (USA)

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Introduction:

The development of adipose tissue is genetically determined, although hyperplastic adipocytes may undergo further hypertrophy as a result of increased calorie intake. There is evidence that diet and

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exercise can reduce fat mass in lipoedema and alleviate tissue pain, provided the reduction is sustained; nevertheless, lipoedema (LiDo) cannot be cured in this way. Current research focuses on oedema formation in adipose tissue and the interstitium, as well as on the cytological, immunological, inflammatory, hormonal and genetic aspects of the condition

1. Interstitial oedema and pain, two manifestations of this condition.

The orthostatic oedema originally described never occurs in the arms in this condition and is not necessarily present in the legs. In women, due to the symmetrical disturbance in fat distribution in the extremities, to the detriment of the trunk, it is less significant as a hallmark of the condition than the pain phenomenon. However, pain in the tissue is the typical clinical feature and is crucial for diagnosis. It comprises sensory and emotional components and can trigger psychological stress. Initial studies show changes in vibration perception and in pressure pain thresholds, thereby providing objective measurements. These scientific findings are being further investigated and could transform our understanding of the condition. The term 'lipohyperplasia dolorosa' (LiDo) is more appropriate than 'lipoedema', as it excludes the concept of 'oedema' and encompasses the genetically determined increase in volume caused by hyperplastic adipocytes, as well as the pathognomonic pain.

2. On the physiology and pathophysiology of lipoedema (LiDo). M2 macrophages, SVF secretome, microRNAs, neoadipogenesis

Current molecular, biological, histological and imaging data suggest that LiDo is caused by an imbalance between regeneration and degeneration of the subcutaneous adipose tissue. A genetically and hormonally mediated increase in vascular permeability activates perivascular stem cell populations, promotes angiogenesis and adipogenesis, and leads to lymphatic stasis in the dermis and subdermis.

Histological examinations reveal enlarged adipocytes, an increased number of M2 macrophages and crown-like structures, suggesting inflammation and the clearance of cellular debris

Endothelial cells and pericytes from the stromal vascular fraction (SVF) exhibit increased expression of the ZNF423 gene, suggesting its role in tissue expansion. The SVF secretome indicates early endothelial dysfunction. Extracellular microRNAs (miRNAs) from SVF cells are altered and influence adipogenic differentiation.

miRNAs could serve as non-invasive biomarkers for early diagnosis and help to distinguish lipoedema (LiDo) from other adipose tissue disorders.

Analysis of lipoedema (LiDo) and control adipose tissue shows that the contact zone between the stroma and septa, as well as sites of inflammation, are crucial for neoadipogenesis and contribute to LiDo hyperplasia.

3. Clinical features of lipoedema (LiDo) and its course

The condition typically affects the shoulders, upper arms and forearms, the buttocks, thighs and lower legs symmetrically, but not the head, neck, trunk, feet or hands. Painful fatty deposits above and below the knees and elbows are common. There is no absolute demarcation of the subcutaneous fat compartments in the leg. The proximal border runs along the pubic crest and

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Kommentiert [Ih17]: add the following: **Introduction and Clinical Definition**

Lipedema is a chronic, progressive disorder of subcutaneous adipose tissue, occurring almost exclusively in women and predominantly affecting the extremities. Characteristic findings included disproportionate enlargement of the extremities with sparing of the feet and hands, pain or tenderness, easy bruising, and impaired mobility. Progression could ultimately result in substantial deformity, disability, and reduced quality of life.

Comorbidities

There is a relatively low prevalence of diabetes and hypertension despite the frequent coexistence of increased adipose tissue and obesity. Possible associations with hypothyroidism and joint hypermobility, including a potential relationship with hypermobile Ehlers-Danlos syndrome, were discussed.

Etiology and Pathophysiology

The etiology of lipedema was considered unknown. Familial occurrence and onset or progression during periods of hormonal change suggested genetic and hormonal influences. The affected tissue was characterized by adipocyte hypertrophy and hyperplasia, increased capillary permeability and fragility, and, with progression, lymphatic dysfunction and fibrosis.

Clinical Features, Classification, and Staging

Diagnosis is primarily clinical. Typical findings included symmetrical disproportionate fat accumulation, cuffing around joints, sparing of hands and feet, pain on pressure, easy bruising, and characteristic subcutaneous nodularity or "spheroids." Lipedema is classified according to anatomical distribution and staged according to increasing changes in skin and subcutaneous tissue, with lipolymphedema representing the most advanced stage.

Conservative Treatment

Conservative management consisted mainly of compression, exercise, skin care, weight management, intermittent pneumatic compression, and manual lymphatic drainage (MLD). The article questioned the specific therapeutic effect of MLD because subsequent studies suggested that true edema is limited or absent in uncomplicated lipedema. Prevention of weight gain and secondary obesity is considered important because obesity may aggravate symptoms and functional impairment.

Liposuction

Lymph-sparing liposuction under TLA is presented as the principal surgical treatment. The objective was not only reduction of disproportionate adipose tissue but also improvement of pain, mobility, gait, quality of life, and other

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the inguinal ligament, the iliac crest (from the anterior superior iliac spine to the posterior superior iliac spine) and from there transversely to the opposite side. This line thus forms the proximal border of lipoedema (LiDo)

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3.1 Painful subcutaneous fatty tissue is a defining feature of lipoedema (LiDo)

The 'pain' major syndrome helps to distinguish lipoedema from other conditions, such as obesity.

Assessing pain requires an understanding of its modern definition – as an 'unpleasant experience', as defined by the IASP. Pain involves complex interactions between sensory, cognitive, emotional and behavioural processes, making it highly context-dependent and variable over time.

The current state of knowledge regarding pain in women with lipoedema (LiDo) is limited. The pain described by patients is generally moderate to severe, worsens over the course of the day and does not respond to painkillers. Emotional assessments, such as the German Pain Questionnaire, indicate moderate emotional distress, which is usually below levels of concern. Overall, women with lipoedema (LiDo) tend to describe their pain primarily as somatic rather than emotional or affective.

Study measurements show that QST on the back of the hand showed no abnormalities; on the thigh, most threshold values were within the normal range, with the exception of increased pressure pain sensitivity and reduced vibration perception. These changes, summarised in the PVTH score, enabled a high degree of accuracy in distinguishing the condition from other changes in adipose tissue, such as obesity, and could, following further validation, serve as a rapid, objective diagnostic tool.

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3.2 Diagnosis: clinical and instrumental

The diagnosis is based on clinical assessment, medical history, the exclusion of other adipose tissue disorders, and a physical examination, including visual inspection and palpation. Only the limbs are affected, whilst the head, neck, trunk, feet and hands remain unaffected. Lipedema (LiDo) can be diagnosed when the distribution of subcutaneous fat is imbalanced in relation to the trunk, palpation is painful, the Stemmer's sign is negative, and the ankle tendons are not clearly defined. As there are no biomarkers, lipedema (LiDo) is frequently underdiagnosed.

Technical procedures and laboratory tests rule out differential diagnoses such as chronic venous insufficiency, but cannot confirm lipoedema (LiDo).

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3.3 Diagnosis and differential diagnosis

Lipohypertrophy refers to a disproportionate and symmetrical distribution of subcutaneous adipose tissue (SAT) that causes no symptoms.

A positive Stemmer's sign indicates secondary lymphoedema, which may be caused by obesity.

Lipoedema (LiDo) associated with obesity manifests clinically as a positive Stemmer-Kaposi sign and signs of lymphoedema, which are confirmed by ultrasound.

Metabolic obesity, which may occur concurrently with lipoedema (LiDo), can be verified both clinically and by means of impedance measurement.

3.4 Co-occurrence of obesity

LiDo is neither caused by obesity nor does it cause it. Over 50% of lipoedema (LiDo) patients have metabolic obesity (BMI > 30). In the case of lipoedema (LiDo), BMI is used solely to classify obesity. The combination of BMI and the waist-to-height ratio (WHtR) allows for a more accurate assessment, as WHtR is not dependent on body weight. Obesity is associated with excess body fat, particularly visceral fat, which increases cardiovascular risk. In lipoedema (LiDo), the fat is subcutaneous and located in the extremities; consequently, despite a high BMI, the cardiovascular risks are lower than in obesity. Comorbidities such as diabetes, high blood pressure or fatty liver are less severe.

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3.4.1 Management of co-occurrence

Unlike diets, surgical treatment of obesity does not affect symptoms in LiDo patients. Obesity and lipoedema (LiDo) must be treated separately. Liposuction of the extremities following bariatric surgery alleviates the symptoms. GLP-1 agonists appear to have the potential to complement bariatric surgery in the treatment of metabolic obesity.

3.5 Course of the disease

The development of lipoedema (LiDo) is genetically determined; weight gain often occurs in conjunction with co-existing obesity. However, pain is not associated with a disproportion or an increase in subcutaneous adipose tissue (SAT). Its progression may be caused by hormonal changes, psychological stress or reduced mobility.

4 Conservative treatment for lipoedema (LiDo)

Conservative treatment is the first-line approach for lipoedema (LiDo), but it is not curative, nor is any analgesic medication. Only a small number of patients opt for liposuction as their primary treatment. Conservative treatment currently comprises a combination of various measures, which are described in various guidelines and consensus documents.

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Current guidelines are available from the Netherlands (2016), Germany (2015, 2024), the UK (2017), Spain (2018) and the USA (2021).

- Almost all guidelines recommend compression, exercise, physical activity and dietary changes. Manual lymphatic drainage (MLD) is rarely recommended, as uncomplicated lipoedema (LiDo) does not damage the lymphatic system or cause oedema.
- Complex decongestive therapy (CDT) is the preferred treatment for lymphoedema and lipo-lymphoedema with mechanical insufficiency.
- Intermittent pneumatic compression (IPC) can relieve pain and treat swelling more effectively than self-administered MLD, ideally in combination with compression garments.
- Compression promotes both venous and lymphatic flow and can relieve pain, improve comfort, optimise the shape of the limbs and increase mobility. Flat-knit compression stockings are suitable for the limbs; circular-knit stockings are sometimes used as well.

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- A healthy diet prevents lipoedema (LiDo) pain and supports the treatment of obesity. Hyperinsulinaemia promotes inflammation and fat accumulation and should be avoided. An adequate diet means avoiding crash diets and taking into account metabolism, nutrients and their pro-inflammatory effects.

The conservative treatment of lipoedema (LiDo) is complex and requires specialists such as doctors, physiotherapists, dieticians, trainers and orthopaedic technicians, as well as taking into account accompanying conditions such as obesity, endocrine disorders, connective tissue weakness or fibromyalgia. This chronic condition requires regular monitoring to ensure that treatments are effective and can be adjusted as necessary.

5 Surgical treatment

5.1 LiDo and veins

Varicose veins in the legs are common in lipoedema (LiDo), so the condition of the veins is important. To avoid phlebolymphoedema and bleeding, vein surgery should be carried out at least eight weeks before liposuction. Gentle, minimally invasive methods such as thermal ablation or sclerotherapy preserve the lymphatic vessels and prevent secondary lymphoedema.

5.2 High-volume liposuction for lipoedema (LiDo)

The introduction of liposuction for lipoedema (LiDo) marks a paradigm shift in lymphological therapy. It significantly reduces limb circumference and symptoms. It is important to use an atraumatic technique to avoid damage to tissue and lymphatic vessels.

The procedure involves the partial removal of subcutaneous tissue to relieve pain, without any aesthetic purpose. It focuses on cellular and ECM changes, particularly glycosaminoglycans, and reduces fluid retention through the removal of cells and proteoglycans.

This technique was researched using body donations and tested on 140 LiDo patients to assess its efficacy in lymphological disorders. It is performed under tumescent local anaesthesia (TLA) and power-assisted liposuction (PAL) using vessel-preserving techniques to remove tissue in cases of lipohyperplasia dolorosa and lymphoedema. To distinguish it from aesthetic liposuction, it is also referred to as 'lymphological liposculpture'.

- Relief from pressure **pain**
- Complex manual decongestive therapy is not required; in fact, in 97 per cent of LiDo patients, further conservative treatment is unnecessary.
- Harmonisation of the volume proportions of the limbs and trunk

Following the operation, patients immediately report relief from pressure, pain and bruising, as well as improved psychological well-being. Studies show that pain usually does not recur afterwards.

5.3 Energy-based skin tightening

Energy-based devices such as lasers, RFAL, helium plasma and ultrasound should be used with caution in lipoedema (LiDo), as the evidence base is limited and there is a risk of damage to lymphatic vessels. They are not standard practice. In liposuction, energy-based devices can

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tighten the skin, but there is no evidence for their use in lipoedema (LiDo). Lasers and RFAL show effects; helium plasma might help; evidence is lacking.

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6. TLA – Pharmacological aspects of tumescent local anaesthesia

Tumescent local anaesthesia (TLA), developed in the 1980s by Jeffrey Klein for liposuction, revolutionised clinical practice and is regarded as a safe standard. It involves the use of amide local anaesthetics such as lidocaine, with or without prilocaine, in high dilutions (0.04–0.01 per cent) and in large volumes (up to several litres). This high dilution offers favourable pharmacokinetics that differ from those of conventional local anaesthesia.

When combined with sedoanalgesia, lidocaine in the tumescent solution can be diluted to 0.0223% to safely remove more fat. The maximum lidocaine infiltration of 55 mg/kg is considered the safety limit.

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The plasma lidocaine level during TLA depends on the lidocaine concentration. Conventional local anaesthesia with 1 per cent or 2 per cent lidocaine results in a rapid rise and fall, whilst 0.05 per cent leads to a plateau over 8–20 hours, although the exact values are unclear. Doses of 35–55 mg/kg are considered safe, as plasma levels remain below 5 µg/ml.

Kommentiert [MC33]: Even doses of up to 55 mg/kg are considered safe. It is important that liver function is normal and that the cytochrome P450 system is not impaired by medication. In cases of impaired liver function, liver capacity may be reduced. Klein and Jeske estimated that 45 mg/kg is safe for operations involving liposuction and 28 mg/ml for those without liposuction.

The addition of prilocaine reduces the amount of lidocaine required. Prilocaine is excreted mainly via the kidneys and the lungs. Prilocaine increases methaemoglobin formation. The maximum dose is 600 mg per kg body weight and must not be exceeded.

7. Safety and limitations during surgery, and complications

Halk describes outpatient liposuction under local anaesthesia (TLA) and, where necessary, sedoanalgesia as the safest method for patients.

A review article in the *Deutsches Ärzteblatt* reported a complication rate of 9.5 per cent for liposuction procedures, regardless of whether they were performed for cosmetic or medical reasons. Of these, 1 per cent were due to bleeding, 4.5 per cent to wound infections and 4 per cent to erysipelas.

Two studies from 1995 and 2019 confirmed that liposuction under tumescent local anaesthesia is safe. The suction cannulas create cavities that expand the wound area in the subcutaneous space. Fluid accumulates in these cavities, which can lead to the build-up of interstitial fluid and an increased risk of infection.

In 1995, Hanke reported in 'Safety of Liposuction in 15,336 Patients' that there were significantly fewer complications with liposuction under tumescent local anaesthesia. The large American multicentre study on the safety of liposuction showed an overall complication rate of 1.12 per cent, regardless of the indication (cosmetic or medical). The results are based on data from 66 dermatological surgeons who contoured a total of around 44,000 body areas.

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Complications	%+Indication	Absolute

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Oedema or ecchymosis of the scrotum and labia	0.38%	167
Infection	0.33%	145
Permanent skin changes	0.26%	114
Persistent post-operative oedema	0.09%	40
Severe or persistent post-operative pain	0.05%	22
Unacceptable scarring	0.01%	5
Σ	1.12%	493

Table 1: Adverse effects following liposuction at TLA. n = 44,000 for the observation period 1995

Gensior et al. reported the following side effects following lymphological liposculpture using LiDo during the observation period 2020.

Complication	%	Absolute
Soft tissue infection,	1.79%	25
Seroma	0.78%	11
Erysipelas	0.28%	4
Necrosis	0.14%	2
Thrombosis	0.07%	1
Σ	3.06%	43

Table 2: Adverse effects following lymphatic liposculpture with LiDo. n = 1,400 procedures during the observation period in 2020

Post-operative aftercare following lymphological liposculpture is crucial for preventing complications. The following post-operative protocol reduced the complication rate to 3.06 per cent, with soft tissue infections and inflammation occurring in 1.79 per cent of cases and a risk of thrombosis of just 0.07 per cent.

- a five-day course of antibiotics with cephalexin (500 mg, 1-0-1)
- a three-day course of treatment with low-molecular-weight heparin
- Immediate mobilisation
- Intensive manual lymphatic drainage (AMLD) combined with compression and physiotherapy over four weeks.

10. Adverse complications

Numerous studies confirm the safety of tumescent liposuction. Although the safety of the procedure is well documented, the usual surgical risks remain; these can be reduced through careful patient selection.

- Erysipelas
- Haematomas and seromas
- Anaemia
- Thrombosis, pulmonary embolism
- Injury to lymphatic vessels

- Skin lesions (hyperaemia, necrosis, ulceration)
- Nerve damage
- Hypovolaemia (shock)

11. Psychological effects of lipoedema (LiDo)

LiDo can have psychological effects, which intensify as symptoms and pain worsen. The data suggest a link between dissatisfaction, protective behaviours such as avoiding exposing visible parts of the body or weight control, and reduced satisfaction. Body image issues may, in the long term, be associated with depression, eating disorders and mental health problems.

12. LiDo: Ethical considerations regarding patient selection and treatment

Current diagnostic criteria are based on medical history, resistance to weight loss, fat distribution and tissue pain, which are assessed by palpation. A negative pinch test generally rules out a diagnosis of lipoedema (LiDo). The diagnostic overlap between lipoedema (LiDo) and lipohypertrophy creates a grey area in which differentiation can be difficult.

12.1 Challenges in diagnosis

Clinical experience shows that diagnostic criteria are sometimes applied inconsistently, which can lead to overdiagnosis. Patients are then classified as having LiDo even if they do not meet the criteria. Misdiagnoses of generalised obesity or lipohypertrophy as lipoedema (LiDo) are common. Careful differentiation between these conditions is important, as the treatment approaches differ fundamentally.

12.2 Liposuction

Liposuction for lipoedema (LiDo) is effective; it alleviates pain, reduces volume and increases patient satisfaction. Tumescence anaesthesia ensures a safe, permanent interruption of the pathophysiological mechanisms during major procedures.

Sometimes, the benefits of liposuction lead to misdiagnoses. Patients may believe they have been diagnosed with LiDo, even though other causes such as obesity, lipohypertrophy or varicose veins have not been ruled out. Medical staff sometimes make a diagnosis of lipoedema (LiDo) without sufficient evidence, leading to unnecessary treatments. Financial incentives exacerbate this cycle.

13. Scientific future

LIPLEG Study

The shift from conservative to surgical treatment in 1997 changed perspectives and accelerated research into this well-known but misnamed condition, 'lipedema'. The LIPLEG study in Germany compares conservative therapy with PAL surgery following a TLA. In this four-year multicentre study conducted by the Joint Federal Committee (G-BA), 405 patients were treated at 14 centres. The primary objective is pain relief. The final results are expected in 2027. Since 2026, patients with statutory health insurance in Germany have been able to undergo surgery covered by their insurance without having to wait for the final study results.

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Liposuction is generally a safe procedure when performed using an appropriate technique and with careful patient selection. A systematic review by Halk et al. found true tumescent liposuction (TTL), using tumescent local anaesthesia without any systemic anaesthesia, to have the lowest rate of serious adverse events (SAEs). Across four studies using strict TTL criteria, no fatalities were reported and SAE rates ranged from 0-0.26 per 1,000 procedures. A review article in the *Deutsches Ärzteblatt* reported a complication rate of 9.5 per cent for liposuction procedures, regardless of whether they were performed for cosmetic or medical reasons. Of these, 1 per cent were due to bleeding, 4.5 per cent to wound infections and 4 per cent to erysipelas, most likely many of these procedures were performed under systemic anesthesia/narcosis(?).

The addition of systemic anaesthesia, particularly general anaesthesia or intravenous sedation, was associated with higher complication rates. The review also identified larger aspiration volumes as factors associated with increased risk. Liposuction performed under TLA in an office-based setting was not associated with increased risk; studies exclusively evaluating office-based procedures reported no fatalities or SAEs.

The most relevant potential complications include:

- bleeding, haematoma or seroma;
- infection, including erysipelas;
- anaemia;
- venous thromboembolism and pulmonary embolism;
- skin injury or necrosis;
- nerve or lymphatic injury;
- fluid imbalance and, rarely, systemic complications.

Overall, the available evidence supports tumescent liposuction under local anaesthesia, preferably with no or only minimal systemic sedation, as the safest approach to liposuction. Appropriate patient selection, procedural expertise and early mobilisation remain important components of safe treatment.

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The LY-PST questionnaire from the Institute for Basic Lymphological Research 'LY.SEARCH' is a free tool for recording medical history, findings, symptoms, treatment and outcomes in LiDo, and facilitates future cohort studies. <https://lido.lysearch.de/de/registrierung/patientin>.

14. Conclusion

- Liposuction is currently the only curative treatment for lipoedema (LiDo) and the associated pain.
- There is an urgent need for a reliable lipoedema (LiDo) test to reduce diagnostic uncertainty.
- Lipohyperplasia dolorosa cannot occur without pain, which distinguishes it from painless fat disorders.
- All evidence points to a biological origin triggered by the lymphatic system, with no psychological cause.
- Compression therapy remains important as a conservative treatment, particularly in post-operative care.
- An evidence-based approach to diagnosis and treatment improves patient outcomes and reduces the burden on the healthcare system.