

Comparison: International Guidelines for Lipoedema Surgery & the Lipoedema Surgical Solution Protocol

compNAME OF PROTOCOL	S2k Guideline Lipoedema	Standard of care for lipoedema in the United States	Our Protocol: Lipoedema Surgical Solution (LSS) & Miami Private Hospital (MPH) Lipoedema Protocol
ORIGIN	Germany	United States of America	Germany + Australia
DATE DEVELOPED	2024. S1 Guidelines first published in 2017 & revised in 2020	2019	2017
TRAINING / DEVELOPMENT	Led by the German Society of Phlebology & Lymphology (DGPL). This is a true multi-disciplinary approach with 11 other societies participating including Dermatological; Internal Medicine; Angiology; Vascular; Operative Endovascular & Preventive Vascular; General & Visceral Surgery; Plastic, Reconstructive & Aesthetic; Lymphologists; Clinical Hypnosis; & Physiotherapy.	In 2019, 21 lipoedema expert panelists & a parliamentarian gathered at the <i>Fat Disorders Resource Society Annual Meeting</i> in 2019 to review the literature & develop consensus Standard of Care guidelines for lipoedema in the US.	Dr Lekich is a Phlebologist. Phlebologists are experts in managing swollen limbs caused by venous, lymphatic & lipoedema diseases. Dr Lekich was trained in lipoedema surgery by Dr Falk Heck of LipoClinic, under the German Guidelines. Training took place over 4 visits to Germany & Dr Heck supervising Dr Lekich's first surgeries in Australia in 2017. Dr Lekich has further expanded this protocol to include screening for stroke risk of comorbidities for holes in the heart & the management of varicose veins prior to surgery for optimal safety & recovery. Doctors at LSS are formally trained by Dr Lekich using a Surgery in Training and Assessment (SITA) tool mandating 100 directly supervised surgeries.
AIM	The guideline ... is intended to bring together the different approaches of the respective professional groups in a consensus-based manner & thus offer a basic concept for the best possible treatment of patients with lipoedema.	Agree on a description of lipoedema & a consensus for standards of care for the US. Develop & publish clinical practice guidelines for use by providers, patients, & families.	This protocol & scope of practice has been documented & submitted by Dr Lekich to all major medical defence organisations, Medicare and the Medical Board in Australia advocating for lipoedema to be treated as a disease, to make the surgery more accessible & more affordable.

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PRE-SURGICAL SCANS & TREATMENTS			
USE OF ULTRASOUND FOR ASSESSMENT	To exclude edema, for example of phlebological origin, ultrasound-based diagnosis may be used. Recommendation 2.14	The arterial & venous vascular status of people with lipoedema should be evaluated. Recommendation 5.1 Chronic venous disease can present with leg swelling & pain & should be considered in the differential diagnosis of lipoedema. Recommendation 5.7 The venous evaluation of people with lipoedema includes a bilateral, lower extremity duplex ultrasound evaluation of the deep & superficial venous systems assessing for valvular insufficiency (reflux), acute or chronic thrombosis & patterns of obstructive flow. Recommendation 5.9 Providers should determine whether symptoms are from lipoedema, chronic venous disease or both as they share many symptoms. Recommendation 5.10 <i>*Suehiro K, Morikage N, Murakami M, Yamashita O, Samura M, Hamano K. Significance of ultrasound examination of skin and subcutaneous tissue in secondary lower extremity lymphedema. Ann Vasc Dis. 2013;6(2):180-8. doi: 10.3400/avd.oa.12.00102. Epub 2013 May 10. PMID: 23825499; PMCID: PMC3692988.</i>	Before proceeding with surgery, our doctors conduct a thorough consultation and the use of ultrasound with specialist vascular sonographers to assess the clinical condition. Scans conducted may include: • CVI (Chronic Venous Insufficiency) leg scan with lymph grading - to determine other causes of swelling with Sub Echogenicity Grade (SEG)* • Deep Venous Duplex ultrasound to assess for life threatening Deep Vein Thrombosis (DVT), Chronic Venous Insufficiency (CVI), venous obstruction from compression, scarring or thrombosis, and flow abnormalities that may contribute to swelling, pain, or ulceration, ensuring surgical safety and optimal pre-operative assessment. • Arterial leg ultrasound scan - for patients at risk of arterial disease it is important to complete this scan before compression garments are prescribed, and before surgery This ensures a holistic diagnosis, identifying any underlying issues like lymphoedema, varicose veins, or other causes of leg swelling that could impact your treatment. All relevant health concerns are addressed to ensure the surgery is safe and effective.

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TREATMENT OF VARICOSE VEINS PRIOR TO SURGERY		A Pre-surgical venous duplex ultrasound &/or treatment of chronic venous disease should be considered especially in patients with lipolymphoedema prior to lipoedema reduction surgery. Recommendation 4.11 Varicose veins from chronic venous disease increase the risk of venous thromboembolism in the legs; treatment of chronic venous disease decreases this risk. Recommendation 4.11 Varicose veins may increase the risk of intra-operative blood loss during surgical treatment of lipoedema. Recommendation 4.11	It is important to note that treating underlying venous conditions will likely have a significant positive impact before any lipoedema surgery. Our doctors have formal training in Phlebology through the Australasian College of Phlebology (ACP) and are experts in venous conditions as they also operate under our sister clinic Vein Doctors Group. Surgery becomes an option only after these conditions are managed, maximising safety and outcomes.
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MANAGING VENOUS COMORBIDITIES		Common venous conditions seen in people with lipoedema include increased risk for venous thromboembolism & conditions associated with chronic venous disease: varicose veins, chronic venous insufficiency, & telangiectasias (spider veins). Recommendation 5.4 Lipoedema, especially later stages, is associated with multiple comorbid conditions that increase the risk of venous thromboembolism, which includes superficial thrombophlebitis, deep vein thrombosis & pulmonary embolism. Recommendation 5.5	TCD (Trans-Cranial Doppler) bubble study is performed pre-operatively to screen for a significant Patent Foramen Ovale (PFO), which is a hole between the atria that remains open after birth in about 1 in 4 adults (≈25%), of which around 1 in 8–10 are significantly sized. Patients who experience the symptoms below are considered to be more likely to have a significant sized PFO, and notably, these are also common symptoms in lipoedema patients: – Migraines with aura – Exercise intolerance – High blood pressure – Shortness of breath – Stroke / TIA – Brain fog – Fatigue A PFO may permit a blood clot (thrombus) or fat embolus to bypass the lungs and enter the brain, increasing stroke risk. During liposuction, fat is loosened and can transiently enter the superficial venous system—thus, a significant PFO raises the risk of fat or paradoxical embolic stroke. While many symptomatic patients have large defects, our experience—to be published—shows that some of the largest PFOs are entirely asymptomatic, with stroke sometimes being the first indication. Consequently, lipoedema surgery is not performed in patients with a known significant PFO without a referral to a structural cardiologist.
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CONSERVATIVE MANAGEMENT			
CONSERVATIVE MANAGEMENT	Effective self-management is an important component of health literacy. It shall be promoted, & the patient shall be encouraged to take an active role. Recommendation 9.1 Self-management should be supported with appropriate measures by caregivers while the responsibility remains with the patient. Recommendation 9.3	Standard conservative therapy for lipoedema includes nutritional guidance (2.0 Medical treatment section), manual therapy, compression garments, recommendations for a pneumatic compression device (external pump) & a home exercise plan. Recommendation 3.2 Home care for lipoedema (self-management or with caregiver assistance) is essential to mitigate progression & optimize quality of life. Recommendation 3.14 Indications for lipoedema reduction surgery include a diagnosis of lipoedema with demonstrated compliance & adherence to or failure of conservative therapies. Recommendation 4.5 Women with lipoedema should be treated with conservative therapy prior to lipoedema reduction therapy Recommendation 4.7	There are pillars of Conservative Management treatment that patients should consider as a prelude to surgery. However, even if a patient is not considering surgery, it is important to ensure elements of conservative management are understood and implemented to avoid serious implications of Lipoedema in the long term and to slow progression. These treatments are detailed during your initial consultation with Dr Lekich and his team and may include: • Wearing flat knit compression garments • Accommodating possible diet and lifestyle adjustments • Undertaking Manual Lymphatic Drainage (MLD) • Psychological support
	COMPRESSION FOR SYMPTOM MANAGEMENT The patients shall be informed that the compression is not suitable for the reduction of adipose tissue. Recommendation 4.4	Compression garments for lipoedema provide comfort & reduce pain by supporting the tissues especially if there is interference by lipoedema tissue pads & manage edema. Recommendation 3.7	We use compression to reduce pain and support tissues for oedema control; it does not reduce adipose tissue. Patients are informed of these limits and this counselling is recorded. First-line is toes-to-waist medical compression stockings; custom flat knit is used when tissue pads interfere, or disease is more advanced.

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COMPRESSION GARMENTS	In diagnosed lipoedema, compression therapy shall be used for pain reduction on the affected extremities. Recommendation 4.1 Compression therapy in lipoedema <i>may</i> be performed initially with medical compression stockings (MCS), compression bandages (CB), & medical adaptive compression systems (MAC). For long-term treatment, MCS should be preferred in routine cases. Recommendation 4.2	People with early stage lipoedema should wear a postoperative compression garment for at least 2–3 months to manage post-operative edema. People with advanced lipoedema &/or lipolymphedema may need to continue compression garments for life.	Compression in our practice follows international lipoedema surgery guidelines and the LSS Protocol. For day-to-day control, we recommend toes-to-waist compression. In more progressed lipoedema/lymphoedema, we step up to custom flat-knit (usually Class 2). Pre-operatively, flat-knit is worn for 6–8 weeks to condition tissues and stabilise swelling Post-operatively, a surgical garment is used immediately, then patients transition back to flat-knit for the remainder of the 6–8-week recovery, with ongoing everyday wear thereafter as clinically indicated.
TYPE OF COMPRESSION GARMENTS	Generally, lipoedema may be treated with circular-knitted or flat-knitted MCS. In case of large changes in the circumference of an extremity or conically formed extremities, as well as marked tissue folds, flat-knitted quality shall be prescribed, because round-knitted material is not suitable for these anatomical conditions. Recommendation 4.7	Fabrics range from lightweight & micro-massage, to circular knit to flat knit, the latter providing the strongest containment. Certified lymphedema therapists may suggest modifications for compression garments, inelastic compression garments, “donning aides”, or adaptive equipment. Recommendation 3.8 If people find it difficult to don & doff compression garments, two garments with a lesser level compression can be layered to achieve adequate compression. Recommendation 4.21	Compression types: • Circular knit toes to waist • Flat knit for progressed cases and surgery • Toes to waist, made to order and class II • Post surgery compression is provided with more ‘stretch’ than flat knits. They can be doubled up with sports compression or round knits, until flat knits are comfortable. Safety note: where clinically indicated ultrasound arterial assessment is performed by specialist vascular sonographers.

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MANUAL LYMPHATIC DRAINAGE	If compression is inappropriate in individual cases or does not result in pain relief, the cardinal symptom pain may be treated by additional lymph drainage in combination with further therapeutic techniques. In this context, the objective of manual lymph drainage is not volume reduction, but the modulation of group C nerve fibers. Recommendation 7.1	Standard manual therapy for lipoedema includes soft tissue mobilization to reduce pain, inflammation & musculoskeletal restrictions, & manual lymphatic drainage as part of an individualized comprehensive therapy program to stimulate lymphatic flow & reduce edema. Recommendation 3.4	• Before Surgery: MLD is required weekly, for 8 weeks prior to surgery for both arm and leg surgeries • After Surgery: MLD is required up to twice a week for 8 weeks post-op & should commence after your DVT check • For patients that struggle with mobility & are prone to dizziness, MLD should commence one week after returning home, alternatively home visit MLD &/or MLD through stockings are options
LIPOEDEMA FRIENDLY EXERCISE	Given that movement in compression or a training program presents an important element in pain relief, it shall be included in the overall therapeutic concept. Recommendation 7.2 The additional implementation of water sports (for example, <i>aquacycling</i>) may have a positive effect. Recommendation 7.4	Exercise programs for people with lipoedema should be individually prescribed, started slowly, & progressed as tolerated. Recommendation 3.10 Beneficial home exercise plans for people with lipoedema include swimming/aquatics, elliptical machines, yoga, stationary bikes, whole body vibration & walking. Impact levels may vary but should remain tolerable & sustainable for long-term adherence. Recommendation 3.12	Lipoedema friendly exercise should be explored with an Occupational Therapist, Physiotherapist or other qualified therapist with an understanding of Lipoedema. Lipoedema friendly exercises may include low-impact sports such as water-based activities such as aqua-aerobics, yoga, cycling or walking depending on the patient.

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PUMPS & OTHER DECONGESTION THERAPIES	Complex physical decongestion therapy should be used in lipoedema with additional edemas of other etiologies. Recommendation 7.4 Manual lymph drainage in combination with additional therapeutic methods should be considered to improve the quality of life (QoL). Recommendation 7.5	Manual therapies, sequential pneumatic compression pumps & exercise should improve lipoedema tissue by decreasing pain & increasing lymphatic flux, which in turn increases movement of glycosaminoglycans from the extracellular matrix into lymphatic vessels. Recommendation 3.3 Pneumatic compression devices stimulate lymphatic flow⁹⁶ & are an option for at-home lipoedema & lymphedema management when there are no contraindications. Recommendation 3.9	For additional benefit, use a compression pump system if able. The compression pump does not replace MLD and is not a mandatory part of the surgical protocol. The pump should start after you have been given a clearance from the DVT check.
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NUTRITION & WEIGHT	Nutrition & weight management shall contribute to the preservation or recovery of mobility & functionality & to the prevention of disease progression. Depending on the individual situation of the patients, the aims shall, therefore, include the achievement or preservation of a healthy body composition, as well as the reduction of pain & symptoms. The basis for weight reduction in coincident obesity shall always be a combination of nutrition, exercise &, if necessary, behavioral therapeutic measures & include both the phase of weight reduction & the long-term stabilization. Recommendation 10.1 – 10.5		BMI & eligibility: BMI is not used as a cut-off for surgery—BMI is unreliable in leg-dominant lipoedema. Decisions are based on disease stage, function, and safety. Support for secondary obesity: dietitian-led, low-inflammatory eating (e.g. low-carb/keto), GP/endocrinology/integrative review; referral pathways for bariatric surgery or specialist temporary gastric balloon when appropriate to improve mobility and outcomes.
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LIPOEDEMA FRIENDLY NUTRITION	The patients shall be advised about the avoidance of short-term diets & to change, instead, their eating habits permanently to an individually adjusted healthy diet. The patients shall be advised that eating habits have favorable or unfavorable effects on blood glucose & insulin levels & thus on lipogenesis & inflammatory processes. Recommendation 10.6 – 10.7 A (hypocaloric, if needed) Mediterranean diet may be recommended based on its anti-inflammatory properties. A (hypocaloric, if needed) ketogenic diet may be recommended, given that weight-reducing & anti-inflammatory, as well as symptom-reducing effects have been described. Recommendation 10.8 – 10.9	Healthy eating patterns for lipoedema can be whole food, enzyme rich, plant-based or ketogenic. Research favors vegetable-based low-carbohydrate diets which correlate with decreased all-cause mortality over animal-based diets. Recommendation 2.13	A Lipoedema diet is essential to manage the condition prior to and after surgery. There is evidence that a low-carb, low-inflammatory, no sugar, high good fats, and no caloric restriction diet helps to reduce pain and inflammation in Lipoedema patients. It can also assist in weight loss. We do not recommend attempting to start a plan independently, but to seek out assistance from a nutritionist or dietician familiar with Lipoedema. For 1 week before and 1 week after surgery, it is advised that you should not be in ketosis. Again, we recommend you work with your dietitian or nutritionist. This can be achieved by maintaining your existing keto diet and adding 1.5L of unsweetened coconut water per day, which will also help with electrolytes. Being out of ketosis should not mean that you are eating bread, rice, pasta, potatoes, or refined sugars. Please seek specific guidance from your dietician To reduce risk of secondary obesity and lymphatic swelling, these dietary changes are to continue permanently, even after surgery, with the guidance of a professional nutritionist / dietician.
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SURGERY FOR LIPOEDEMA			
RECOMMENDED TYPE OF SURGERY	Liposuction shall be used as surgical method of choice for the sustainable reduction of the affected subcutaneous adipose tissue of lipoedema on legs & arms. Recommendation 12.1	Lipoedema reduction surgery is currently the only available technique for removing abnormal lipoedema tissue such as adipocytes, nodules, fibrotic extracellular matrix, & other non-adipocyte components. It is also the only treatment that slows progression of lipoedema & ideally would be performed before complications & disabilities from lipoedema develop. Recommendation 4.1	The LSS Lipoedema-Extraction surgery is performed using Liposuction. The standard of surgery is minimally invasive, not requiring open surgery. This Lipoedema-Extraction surgery is a medical treatment for Lipoedema aimed at stopping progression, managing pain and optimizing mobility

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LIPOSUCTION FOR LIPOEDEMA SURGERY	Liposuction shall be performed with a tissue- & lymph vessel-conserving method. The following aspects shall be observed: • use of vibration-assisted (PAL) or water jet-assisted (WAL) systems • surgery performed with TLA or general anesthesia • 1–4 sessions on both legs, 1–2 sessions on both arms • observation of an exposure time of at least 60 to 120 minutes after infiltration of TLA to facilitate gentle aspiration • limitation of the administered tumescent solution to 10 liters (when using the solution according to Klein with a maximum lidocaine dose of 45 mg/kg BW) • maximum aspiration volume of 10% of the body weight Recommendation 12.4	Lipoedema reduction surgery utilizes suction lipectomy (liposuction), excision & manual extraction that spares blood & lymphatic vessels. The types of suction lipectomy recommended for people with lipoedema are based around tumescent liposuction which uses a solution injected into the tissue to decrease pain & bleeding. Other mechanical methods can also be used such as Water Assisted Liposuction (WAL) & Power Assisted Liposuction (PAL). To date, all studies showing clinical improvements for women with lipoedema used tumescence or WAL techniques. There is little published information on the safety of laser or ultrasound technology for removing lipoedema tissue. Recommendation 4.2 Debulking lipoedema tissue may require larger than traditional suction aspirate volumes & multiple surgeries with proper intervals in-between. This is not cosmetic liposuction as there are mobility, pain & health benefits when removing lipoedema tissue Recommendation 4.6	Lipoedema Surgical Solution — Water Assisted LipoExtraction (WAL) In 2017 Dr Lekich was trained by Dr Falk-Christian Heck, a recognised pioneer of the Body-Jet WAL technique and our approach consistently follows European S2K guidance, favouring staged, lymph-sparing WAL over “mega liposuction” or combined large skin-and-fat resections to optimise safety and function. • Surgery uses a lymph-sparing German WAL protocol with tiny incisions and no long scars. • Symmetrical treatment (both legs or both arms in one session) supports balance, form and gait. • Staged plan removes lipoedema fat methodically from hips to ankles (and shoulders to wrists for arms) for completeness and tissue care. • Specialist anaesthetists focus on early mobilisation so patients walk freely on the day of surgery to reduce DVT risk. • Typical interval between stages is 6–8 weeks. • Technique aims for low infection rates, protection of lymphatics to avoid secondary lymphoedema, and careful fluid and anaesthetic dosing to minimise neuro and cardiac toxicity. • Order of areas is individualised based on symptom burden, function and safety.
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POST-SURGICAL RECOMMENDATIONS			
POST SURGICAL DVT CHECKS		People with lipoedema, especially higher stages, are at increased risk for venous thromboembolism & pulmonary embolus after surgery. We recommend venous thromboembolism risk stratification & treatment when indicated Recommendation 4.10	Post-surgery patients are required to stay locally on the Gold Coast, within a 10-to-15-minute drive to the hospital for the specified time after discharge, typically a minimum 7 nights after discharge, or as specified by your doctor. Around 3 – 5 days post op, patients will return for an ultrasound appointment to check for Deep Vein Thrombosis (blood clot in a deep vein) and seroma review that can be drained if needed under ultrasound guidance.
SUBSEQUENT PLASTIC SURGERY		Large tissue sacks may remain after successful surgery & weight loss, for which subsequent plastic surgery in the form of dermo-lipectomy may be required. Recommendation 4.20	Skin management & referrals (post-op) Many patients are referred to us by plastic surgeons for lymph-sparing removal of lipoedema tissue. Where aesthetic or functional skin reduction is later appropriate and requested, we refer patients back to their plastic cosmetic surgeons. Patients are routinely reviewed 9–12 months after completing surgery to assess veins, skin recoil and function, and to determine whether revision or skin excision is needed. If redundant skin or tissue sacks persist, we coordinate referral after allowing adequate time for natural retraction (≈12 months); this pathway is discussed pre-operatively. Renuvion option: Can be added during primary lipoedema extraction as an adjunct or 9–12 months later as revision and renuvion. Renuvion assists haemostasis (aiming to reduce post-op

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			bleeding and transfusion needs) and to support subdermal collagen formation and contraction. This may reduce the need for formal skin resection or allow smaller, targeted excisions with a cosmetic plastic surgeon.
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