



Complete Decongestive Physiotherapy

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Summary of Basic Concepts

Lymphedema is a chronic condition; therefore, in clinical practice, therapy is intended to return the disease to its latent phase (a condition relatively free from edema, despite the limited function of the lymphatic drainage system) and thereby to attain prolonged control of signs and symptoms of lymphedema.

- The objectives of physiotherapy include improvement of lymphatic vascular function, to soften fibrosclerotic irregularities, to reduce collagen deposition, and to reduce cutaneous microbial growth.
- The components of CDP are manual lymph drainage and compression therapy.
- The physiological effects of compression include displacement of fluid from the interstitium and reduction of venous pressure, reduction of lymphatic preload, increase in lymph formation, and increase in lymph flow through existing conduits, particularly during exercise.
- Complete decongestive therapy is a two-phase therapy.
- Contraindications to CDP include acute erysipelas, acute thrombophlebitis, phlebothrombosis, decompensated heart failure, and Stage IV peripheral artery occlusive disease.
- Patients with chronic lymphedema must be prepared for lifelong medical compression.
- Long-term results of conservative treatment of lymphedema with complete decongestive physiotherapy depend not only on the stage of lymphedema, during which treatment has begun, but also on the compliance of the patient, as well as the presence of comorbidities that aggravate edema as well on the skill of the therapist.

31.1 Introduction

Lymphedema is a chronic condition; therefore, in clinical practice, therapy is intended to return the disease to its latent phase (a condition relatively free from edema, despite the limited function of the lymphatic drainage system) and thereby to attain prolonged control of signs and symptoms of lymphedema.

As early as 1892, Winiwarter recognized physiotherapy as the most effective form of therapy. In his book *Krankheiten der Haut und des Zellgewebes* (Skin and Cellular-Tissue Disorders [6]), he describes a «new» therapeutic concept that was intended to coordinate various physical measures, like massage, methodical compression, exercise, and skin care. He was already emphasizing the need for comprehensive medical care.

In recent decades, physiotherapy for lymphedema has experienced a revival and has developed into «complete decongestive physiotherapy» (CDP). Its objectives are:

- To improve the lymphatic vascular function
- To soften fibrosclerotic irregularities
- To reduce collagen deposition
- To reduce microbial growth on the skin to prevent opportunistic infections

In addition, the attainment of an individualized, active, and age-appropriate quality of life is essential.

The adequate administration of CDP enables patients to integrate into their social surroundings and to secure their schooling and professional education. Among geriatric patients, the imminent need for high-maintenance care can be forestalled for many years. The quality of life of patients of all ages can be improved. The goals of therapy should be set by both the doctor and patient, in a shared decision-making process.

CDP is the basic therapy for limb lymphedema, even if the possibility of surgical intervention is entertained. The components of CDP are:

- Manual lymph drainage [7, 8]: a massage technique that is described extensively in ► Chap. 30.
- Compression therapy [1]: this form of therapy generally is carried out with medical compression bandages in Phase I of CDP (see below) and with made-to-measure compression garments in Phase II. Short-stretch bandages of various widths are used, with appropriate padding.

The effects of compression therapy are [9–11]:

- Displacement of fluid from the interstitium and reduction in venous pressure; these, in turn, have an anti-edematous effect.
- Normalization of a pathologically raised ultrafiltration, i.e., a reduction of the lymphatic preload.
- Accelerated inflow of tissue fluid into the lymph capillaries, i.e., an increase in lymph formation.
- Increase in lymph flow in the extant, functioning lymph vessels, particularly when combined with exercise.

Medical compression bandages are required:

- To give an optimal, even distribution of pressure while taking into consideration the condition of the skin
- To leave movement unrestricted
- To be applied firmly without slipping or induction of pain

Composition of medical compression bandages [2, 12]:

For the desired therapeutic and protective skin-care indications, a cotton wool tubular dressing is wrapped around the skin to protect it. Padding materials made of synthetic fibers or thin layers of foam are applied over this cylindrical bandage, for an even distribution of pressure. Uneven foam padding materials can be used, too, in order to achieve a micro-massage effect during movement. Compression pressure is finally secured with short-stretch elastic bandages. It should be taken into account that, in addition to the layer of protective padding material, skin wrinkles and indentations must be filled with made-to-measure pieces of foam. Fingers and toes are wrapped with double layers of elastic bandages. ■ Table 31.1 shows the desired compression, the type of protective padding material, and the wearing time of the medical compression bandage, according to the patient age.

Table 31.1 Compression bandaging depends on the age of the patient and the stage of the lymphedema

		Pressure	Padding		Maximum application time
Children	6 months–2 years	10–20 mmHg	Smooth (padding bandages/foam)		12–16 h
	2–6 years	20–30 mmHg	Smooth	Padding bandage	16–20
			Uneven	Foam	
	6–12 years	20–30 mmHg	Smooth	Padding bandage	16–20 h
			Uneven	Foam	
	Adults	Stage I	20–30 mmHg	Smooth	Padding bandage
Smooth				Foam	
Stage II		30–46 mmHg	Smooth	Padding bandage	18–22 h
			Uneven	Foam	
Stage III		46 mmHg and stronger	Smooth	Padding bandage	18–22 h
			Uneven	Foam	
Lymphedema combination forms		Individual	Individual		Individual
Geriatric		60–70 years	30–46 mmHg	Smooth	Padding bandage
	Uneven			Foam	
	Over 70 years	20–30 mmHg	Smooth	Padding bandage	12–16 h

Medical compression stockings, optimally, are custom-made [13], flat-knitted garments, intended to prevent re-accumulation of edema fluid. Their stretchability should match that of the short-stretch bandages. Patients with chronic lymphedema must be prepared for lifelong medical compression, even if the lymphedema can be successfully reduced to its latent state with therapy. The type of compression stockings a patient requires (Table 31.2) can change over the course of his life, relative to the receding of the lymphedema or the occurrence of new illnesses (orthopedic, neurological, etc.).

The positive effects of decongestive kinesiotherapy on venous hemodynamics and lymph flow have been experimentally and clinically substantiated [14, 15]. The contraction and relaxation of the skeletal muscles lead to an increase of pressure in the interstitium,

Table 31.2 Compression stockings depend on the stage and localization of the lymphedema

Location	Stage I	Stage II	Stage III
Toes/foot	Toe caps CCI. I	Toe caps CCI. I	Toe caps CCI. I
	Socks CCI. I	Socks CCI. II	Socks CCI. III
Lower leg + toes/foot	Toe caps CCI. I	Toe caps CCI. I	Toe caps CCI. I
	Knee stockings CCI. II	Knee stockings CCI. II	Knee stockings CCI. IV
Whole leg + toes/foot	Toe caps CCI. I	Toe caps CCI. I	Toe caps CCI. I
	Groinal stocking CCI. II	Groinal stocking CCI. III	Groinal stocking CCI. IV
Truncal quadrant + whole leg + toes/foot	Toe caps CCI. I	Toe caps CCI. I	Toe caps CCI. I
	Tights with one leg CCI. II	Tights with one leg CCI. III	Tights with one leg of CCI. IV
		Truncal garment CCI. II	Truncal garment CCI. II
Truncal quadrant + both legs + toes/foot	Toe caps CCI. I	Toe caps CCI.	Toe caps CCI. I
	Tights CCI. II	(a) Knee stockings CCI. III	(a) Knee stockings CCI. IV
		(b) Half hose CCI. II	(b) Half hose CCI. II/ III
Lower arm + hand	Long glove CCI. I	Long glove CCI. II	Long glove CCI. II or III
Whole arm + hand	Sleeve CCI. I	Sleeve CCI. II	Sleeve CCI. II or III
	Glove CCI. I	Glove CCI. II	Glove CCI. II

which transfers to the lymphatic wall, resulting in an increase in the pulsation of the lymphangions. Depending on the position of the body, intensive abdominal breathing can have a similar effect on the central part of the veins and lymphatic trunks. Decongestive kinesiotherapy and respiratory therapy can be performed as a single treatment or as group therapy. In addition, the patient should learn an individual training program, devised according to his age and profession, which would then be continued as long-term therapy. Walking, Nordic walking, cycling, treadmill exercise, stationary cycling, swimming, and endurance sports are all specifically suitable.

Dry, itchy skin is often a part of chronic lymphedema. Due to the disturbance in the physiological balance between the moisture and lipid content of the skin, bacterial and mycotic infections, including congestive dermatitis, frequently occur [3, 16]. The application of disinfectant and antimycotic agents is indicated as the therapy for infections. Antihistamine agents are shown to be effective against congestive dermatitis. Topical corticosteroids can also be temporarily indicated. Urea, ceramides, and chole-

terol-containing moisturizers have proven themselves capable of restoring the physiological balance between moisture and lipid content. Since skin maceration and intertrigo can occur in deep wrinkles, powder and, if necessary, padding are indicated to dry the skin after disinfection.

31.2 The Use of CDP

Complete decongestive therapy is a two-phase therapy [4, 17–19]. Phase I is aimed at mobilizing the congested, protein-enriched fluid and is intended to initiate reduction of any increased connective tissue present. Instruction and information regarding self-treatment procedures and a suitable lifestyle are given during this phase. Phase II involves optimizing and preserving the successes achieved by the therapy in Phase I. The procedures to be undertaken (Table 31.3) depend on the stage of lymphedema in which therapy is commenced.

Table 31.3 Prevention and two-phase treatment of lymphedema with CDT

Stage	Symptoms	Phase I decongestion	Phase II optimization	Phase III preservation
Stage 0	No swelling, pathological lymphoscintigram	Prevention when lymphedema risk factors present		
Stage I	Edema of soft consistency, raising of the limb reduces swelling	MLD: 1 × per day, compression bandaging, exercise, duration 14–21 days		MLD: in series compression garments as required or consistent in the long term
Stage II	Edema with secondary tissue alterations, raising of the limb without effect	MLD: 2 × per day, compression bandaging, exercise, duration 24–28 days	MLD: 1–2 × per week for the duration of 2–5 years, compression garments and bandaging, exercise, repetition of Phase I	MLD: in series or 1 × per week, compression garments worn consistently in the long term, exercise
Stage III	Elephantiasic hard swelling, often of lobular form with typical skin alterations	MLD: 2–3 × per day, compression bandaging, exercise, duration 28–35 days	MLD: 2–3 × per week for the duration of 5–10 years, compression garments and bandaging, exercise, repetition of Phase I	MLD: in series or 1–2 × per week, compression stockings worn consistently in the long term, exercise

The long-term success of complete decongestive physiotherapy depends on the comprehensive medical care of the patient. Notoriously, the extent of the restriction in function of the lymphovascular system is only a part of the pathophysiology of lymphedema. The clinical picture and also the therapy requirements are influenced by several comorbidities that lead to an increase in the amount of fluid to be transported. Diseases that influence the function of the arteries, blood capillaries, veins, and ground substance impede lymph formation or increase lymphatic loads. Such pathophysiological processes can aggravate both primary and secondary lymphedema. Patients who suffer from chronic limb lymphedema require a complete medical assessment before complete decongestive physiotherapy has begun and later, as is often the case with chronic illnesses, a regular medical checkup. Adequate treatment of diseases that aggravate lymphedema is essential if complete decongestive physiotherapy is to succeed.

31.3 Indications, Contraindications, and Modification of CDP

In order to prevent any side effects of CDP, awareness of the indications, contraindications, and forms of its modification is mandatory [20]. There are many diseases that require an individual adaptation of the application of complex decongestive physiotherapy to the condition of the patient. The most common include:

- Hypertension
- Coronary heart disease
- Heart failure
- Diabetes mellitus
- Chronic venous insufficiency
- Malignancies
- Rheumatic disorders
- Peripheral artery occlusive disease
- Peripheral polyneuropathy

Contraindications to CDP include:

- Acute erysipelas
- Acute thrombophlebitis
- Phlebothrombosis
- Decompensated heart failure
- Stage IV peripheral artery occlusive disease

Treatment of genital and head and neck lymphedema with complete decongestive physiotherapy demands a substantial experience and should only be carried out under specialized clinical conditions.

Quality of life and patient satisfaction during treatment with complete decongestive physiotherapy depend to a large extent on realistic therapy goals and their attainment. Many patients can only achieve their therapy goals through adequate psychosocial support. Professional therapy and assistance are essential. The diagnosis of lymphedema alone and the implementation of the necessary self-treatment procedures call for a great psychosocial effort on the part of the patient and his family to adjust to the diagnosis and its implications. Psychotherapy is usually required to help with this [5, 21, 22].

31.4 Long-Term Therapy Results

Long-term results of conservative treatment of lymphedema with complete decongestive physiotherapy depend not only on the stage of lymphedema, during which treatment has begun, but also on the compliance of the patient, as well as the presence of comorbidities that aggravate edema as well on the skill of the therapist.

As a rule, primary lymphedema in infancy presents without concomitant diseases. A clinical trial including 452 children over 12 years showed that in 85% of cases, the success of therapy after Phase I of CDP could not only be preserved but could be further improved. Treated individuals had unimpaired educational and professional life attainment when compared with unaffected children [22, 23].

A second clinical trial to assess the long-term success of treatment was carried out with 512 adult patients. It showed that there was a strong correlation between the prevalence of comorbidities and edema relapses: in patients with lymphedema of the lower limb without concomitant diseases, therapy success after Phase I of CDP can be maintained for 15 years. In patients with combined forms of lymphedema, 91% of cases repeated Phase I of CDP due to edema relapses over the same length of time [24].

In geriatric patients, long-term success and goals of therapy not only depend on comorbidities but also on the mental state of the patient.

Highlighted References

1. Földi E, Földi M, Weissleder H. Conservative treatment of lymphedema of the limbs. *Angiology*. 1985;36:171–80.
2. Thoma H, Schneider B, Strößenreuther R. Application of compression bandages. In: Foeldi M, Foeldi E, editors. *Foeldi's textbook of lymphology*. München: Elsevier/Urban-Fischer; 2006.
3. Földi E. Prevention of dermatolymphangioadenitis by combined physiotherapy of the swollen arm after treatment for breast cancer. *Lymphology*. 1996;29:48–9.
4. Földi E. The treatment of lymphedema. *Cancer*. 1998;83(suppl 12):2833–4.
5. Williams AF, Moffatt CJ, Franks PJ. A phenomenological study of the lived experiences of people with lymphoedema. *Int J Palliat Nurs*. 2004;10(6):279–86.

References

6. Winiwarter A. Billroth & Luecke (Hrsg). In: *Die Krankheiten der Haut und des Zellgewebes*. Stuttgart: Ferdinand Enke; 1892.
7. Vodder E. *Die manuelle Lymphdrainage und ihre medizinischen Anwendungsgebiete*. Erfahrungsheilkunde 16; 1966.
8. Földi M, Strößenreuther R. *Grundlagen der manuellen Lymphdrainage*. 4th ed. München: Elsevier; 2007.
9. Schneider W, Fischer H. *Grundlagen und Technik der Kompressionsbehandlung*. *Internist*. 1967;8:383.
10. Jünger M, et al. Einfluss einer Kompressionstherapie bei Patienten mit chronischer venöser Insuffizienz auf die kutane Mikrozirkulation. In: Weissler H, editor. *Kompressionsbestraumpfung bei Extremitätenlymphödemen*. Köln: Viavital Verlag; 1999. p. 21–30.
11. Bollinger A. Fließgeschwindigkeit in der Vena saphena magna und der Vena femoralis mit und ohne Kompressionsverbände. *Swiss Med*. 1980;2:61.
12. Földi M, Földi E, Kubik S, editors. *Textbook of lymphology*. München: Elsevier GmbH, Urban & Fischer.
13. Wienert V, Hansen R. Anmessen von medizinischen Kompressionsstrümpfen am liegenden oder stehenden Patienten? *Phlebologie*. 1992;21:236–8.

14. Strößenreuther R. Entstauende Bewegungs- und Atemtherapie, Krankengymnastik sowie weitere Maßnahmen der physikalischen Therapie. In: Lehrbuch der Lymphologie. 6th ed. Stuttgart: Elsevier; 2005.
15. Pärtsh H. Verbesserte Förderleistung der Wadenmuskelpumpe unter Kompressionsstrümpfen bei Varizen und venöser Insuffizienz. *Phlebol U Proktol.* 1958;7:58–66.
16. Asmussen P. Hautpflege beim Lymphödem. In: Földi M, Földi E, editors. Das Lymphödem und verwandte Krankheiten. 8th ed. München: Urban & Fischer; 2003.
17. Brunner U, Frei-Fleischlin C. Gegenwärtiger Stand der kombinierten physikalischen Entstauungstherapie beim primären und sekundären Lymphödem der Beine. *VASA.* 1993; Band 22(1).
18. Földi E, Baumeister R, Bräutigam P, Tiedjen K. Zur Diagnostik und Therapie des Lymphödems. *Sonderdruck Deutsches Ärzteblatt.* 1998;13,S.: A-740–747, B-610–614, C-561–565.
19. Bernas M, Witte MH. Consensus and dissent on the ISL consensus document on the diagnosis and treatment of peripheral lymphedema. *Lymphology.* 2004;37:165–7.
20. AWMF-Leitlinien online. Diagnostik und Therapie der Lymphödeme. www.uni-duesseldorf.de/AWMF, Stand 04/2009.
21. Flagg F, Döller W, Jäger G, Apich G. Prävalenz komorbider psychischer Störungen bei Lymphödempatienten in der medizinischen Rehabilitation. *Praxis Klinische Verhaltensmedizin und Rehabilitation.* 2006;71:75–82.
22. Jäger G, Döller W, Roth R. Quality of life and body image impairments in patients with lymphedema. *Lymphology.* 2006;39:193–200.
23. Schöhl J. Das primäre Lymphödem des Kindes: Langzeittherapieverlauf und Lebensqualität. [Inaugural-Dissertation, University Freiburg]. 2010.
24. Földi E. Results and failures of conservative treatment (CDT) of lymphedema. Lecture during 22. ISL-Congress, Sydney, Australia; 2009.