Chapter 27
Complete Decongestive Therapy

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Introduction

Lymphedema is a chronic condition; therefore, in clinical practice, therapies try to reduce the disease to its latent state (a condition relatively free from edema, despite the limited function of the lymphatic drainage system) and thereby attain a prolonged alleviation of the affliction. 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,"[1]) he describes a "new" therapy concept that would coordinate various kinds of 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 function of lymph vessels
- To soften the fibrosclerotic indurations
- To reduce increased connective tissue
- To sanitize the skin to prevent opportunistic infections

In addition, attaining a quality of life that is individual, active, and suited to age is just as essential as performing self-treatment procedures.

The adequate administration of CDP enables patients to integrate into their social surroundings and to secure their schooling and professional education. Among geriatric patients, we are able to delay the imminent need for high-maintenance care 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.

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Complete Decongestive Physiotherapy

CDP is the basic therapy for limb lymphedema, even if any possibility of a surgical procedure is given. Its components are:

1. Manual lymph drainage[2,3]: a massage technique that is described extensively in Chap. 28.
2. Compression therapy[4]: this form of therapy generally is carried out with medical compression bandages in phase 1 of CDP (see below), and with made-to-measure compression garments in phase 2. Short-stretch bandages of various widths are used with appropriate padding. The effects of compression therapy are as follows[5-7]:

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

   Medical compression bandages are required:

   - To give an optimal, even distribution of pressure, whilst taking into consideration the condition of the skin
   - Not to restrict movement
   - To have firm application without slipping or hurting

   Composition of medical compression bandages[8,24]:

   According to the appropriate curative and protective skin-care procedure, a tubular dressing made from cotton wool is wrapped around the skin to protect it. Padding materials are applied over this cylindrical bandage: a padding bandage made of synthetic fibers or thin layers of foam 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 as well as 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 27.1 shows the desired compression, the type of protective padding material and the wearing time of the medical compression bandage, according to the age of the patient.

   The medical compression stockings are custom-made,[9] flat-knitted garments, which are meant to prevent re-accumulation of edema fluid. Their stretchability should match that of the elastic bandages. Patients with chronic lymphedema must wear medical compression stockings their whole life, even if the lymphedema can be successfully reduced to its latent state with therapy. The type of compression stockings a patient requires (Table 27.2) can change over the course of his life, relative to the receding of the lymphedema or the occurrence of new illnesses (orthopedic, neurological, etc.).

Table 27.1 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 years–6 years	20–30 mmHg	Smooth	Padding bandage	16–20
			Uneven	Foam	
	6 years–12 years	20–30 mmHg	Smooth	Padding bandage	16–20 h
			Uneven	Foam	
Adults	Stage I	20–30 mmHg	Smooth	Padding bandage	12–16 h
			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	18–22 h
			Uneven	Foam	
	Over 70 years	20–30 mmHg	Smooth	Padding bandage	12–16 h

Table 27.2 Compression stockings depend on the stage and localisation of the lymphedema

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

3. Decongestive kinesiotherapy and respiratory therapy[10,11]: the positive effects of kinesiotherapy on venous hemodynamics and lymph flow are experimentally and clinically proven. The contraction and relaxation of the skeletal muscles lead to an increase in pressure in the interstitium, 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 to this, 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, stationary cycling, swimming, i.e., endurance sports, are specifically suitable.
4. 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, inclusive congestive dermatitis, frequently occur.[12,13] The application of disinfectant and antimycotic agents is indicated as the therapy for infections. Antihistamine agents are shown to be effective against congestive dermatitis, cortisone cream can be temporarily indicated, too. Urea, ceramides and cholesterol-containing moisturizers have proved themselves capable of restoring the physiological balance between moisture and lipid content. Since skin maceration and intertrigo can occur in deep wrinkles, we would recommend powder and, if necessary, padding, to give the skin a dry disposition after disinfecting it.

The Use of CDP

Complete decongestive therapy is a two-phase therapy[14-17]:

Phase 1 is aimed at mobilizing the congested protein-enriched fluid and, if present, initiates a reduction in increased connective tissue. The instructions and information about self treatment procedures and a suitable life style are given during this phase.

Phase 2 involves optimizing and preserving the success already achieved by the therapy in phase 1. The dose of therapy procedures to be undertaken (Table 27.3) depends on the stage of disease in which lymphedema therapy is commenced.

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 co-morbidities 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 the 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 is begun, and later, as is often the case with chronic illnesses, a regular medical check-up. Adequate treatment of diseases that aggravate lymphedema is essential if complete decongestive physiotherapy is to succeed.

Table 27.3 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

Indications, Contraindications and Modification of CDP

In order to prevent any side-effects of CDP, awareness of the indications, contraindications, and the forms of its modification is mandatory.[18] There are many diseases that require an individual adaptation of the application of complex decongestive physiotherapy to the condition of the patient. The most commons include:

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

Contraindications of CDP are:

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

Treatment of head lymphedema and genital lymphedema with complete decongestive physiotherapy demands a large amount of experience in this area and should only be carried out under specialized clinical conditions.

Quality of life and patient satisfaction during treatment by complete decongestive physiotherapy depends to a large extent on realistic therapy goals and their achievement. Many patients can only achieve their therapy goals by keeping psychosocial support in mind and using it. Professional therapy and assistance are essential. Even the diagnosis of lymphedema 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.[19-21]

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 is 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 that lasted 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. Furthermore, it shows equal possibilities in education and professional life compared with unaffected children.[22]

A second clinical trial concerning the long-term success of the 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 combination forms of lymphedema, 91% of cases repeated phase I of CDP due to edema relapses over the same length of time.[23]

In geriatric patients, long-term success and goals of therapy not only depend on comorbidities, but also on the mental state of the patient. On the other hand, it is precisely the improvement in the mobility of lymphedema sufferers that is a distinct measure against mental afflictions.

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