Breast cancer-related lymphoedema

Scientific information on compression therapy for healthcare professionals
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Foreword

Breast cancer treatment can involve extirpation, irradiation or transection of axillary lymph nodes. This can damage or block the drainage areas of the lymphatic system. One possible consequence is breast cancer-related lymphoedema. It is among the most frequent concomitant symptoms of breast cancer treatment.

Following breast cancer treatment, 20 to 30% of patients develop breast cancer-related lymphoedema of the arm or chest. If breast cancer treatment involves adjuvant radiotherapy or extirpation of several lymph nodes, this risk can increase markedly. Furthermore, it is a fact: the incidence of breast cancer-related lymphoedema continues to increase in the years following breast cancer surgery.

Breast cancer-related lymphoedema is a chronic progressive disease. Patients’ mobility is severely impaired. Concomitant symptoms, such as skin and tissue changes, and an increased psychological morbidity additionally occur at the advanced stage of lymphoedema. All these factors affect the patients’ quality of life.

However, compression therapy is an effective method for the appropriate treatment of oedema. It reduces the oedema volume and this is concurrently associated with a marked improvement in the subjective symptoms and thus the quality of life.

At the same time, however, it can be observed in clinical practice that not all patients receive adequate compression therapy. This may be due, in part, to the image that compression products have among patients. Compression sleeves, for example, are often considered to be unattractive and stigmatising.

At this point, the women affected should be given specific advice. How effective are compression sleeves? Why is it so important to wear them continuously? What are the properties of modern compression products? Many patients do not know that modern compression sleeves are very comfortable to wear and are also designed to be visually attractive. If patients are given sufficient information, this can lead to an overall improvement in treatment acceptance.

This brochure provides you with the results of current studies on compression therapy in breast cancer-related lymphoedema. Two questions are of primary concern:

What does compression therapy achieve in detail and which factors affect the success of treatment? You can read the results on the following pages.

“Compression therapy is the most important approach to the treatment of breast cancer-related lymphoedema – considered both in isolation and as part of a multi-stage therapy. Besides early diagnosis and the right garment, a comprehensive health education is the most important element of patient management. Because only consistent treatment compliance can effectively counteract progression of the lymphoedema.”
Pathogenesis of breast cancer-related lymphoedema

Breast cancer-related lymphoedema is a chronic disease, which, if left untreated, takes a progressive course in most cases. Complex decongestive therapy (CDT) and compression therapy are effective means of halting its progression and permanently reducing the oedema volume.

Risk of breast cancer-related lymphoedema
Breast cancer-related mortality has declined in recent years. Thanks to new technical possibilities, diagnoses can often be made at an early stage. As a result, more effective treatment options are available. In particular, breast cancer patients whose tumours are still at an early stage can achieve approximately the same life expectancy of a woman of the same age without breast cancer.1,2 Consequently, an increase in treatment-related sequelae must be expected.

The most frequently occurring consequence of breast cancer surgery, including breast-conserving surgery, is lymphoedema of the arm or chest. It develops whenever lymphatic drainage areas are extensively damaged or obstructed. This is the case if axillary lymph nodes are extirpated or if the patient undergoes adjuvant radiotherapy. The risk of metastasis is thereby reduced. The adjuvant radiotherapy damages the lymphatic vessels, probably as a result of radiation-induced fibrosis.3

On the basis of currently available study data, it can be assumed that a mean of 20 to 30 % of patients are affected by breast cancer-related lymphoedema – in the presence of certain factors, this risk can be greatly increased.4

Stages of breast cancer-related lymphoedema

Stage 0
At this stage, initial damage can be detected in lymphoscintigraphy. Although there is damage to the lymphatic drainage system, the transport capacity can still cope with the quantities of waste products eliminated via the lymph system. The affected region must be assumed to be at risk of lymphoedema. No swelling or other symptoms occur at this stage.

Stage I
At Stage I, interruption of or damage to the axillary lymph system leads to increased fluid accumulation in the interstitium of the subcutaneous arm or thoracic tissue. The tissue of the lymphoedematous area is still soft at this stage; pitting occurs if pressure is applied with the finger. Elevating the arm completely resolves or at least partially reduces the swelling. The volume and weight increase of the affected limb can severely impair the patients’ mobility. This can lead to pain and impaired sensibility. At this stage, the lymphoedema is reversible – it can resolve spontaneously or regress to the asymptomatic Stage 0 with the help of compression therapy.

Stage II
Left untreated, the disease can progress: a chronic inflammatory reaction develops with increasing fibrosis of the tissue. The skin loses its elasticity and susceptibility to infections increases. At this stage, the swollen tissue is firm and elastic. Elevation of the arm can no longer reduce the swelling. In addition to the initial tissue changes (protein fibrosis), mild skin changes occur (pachydermia, hyperkeratosis, papillomatosis). CDT and compression therapy, performed as part of an intensive oedema treatment, can incrementally reduce the oedema volume and the tissue fibrosis.

4 Deutsche Krebgesellschaft e.V. (2008): Interdisziplinäre S3-Leitlinie für die Diagnostik, Therapie und Nachsorge des Mammakarzinoms, Germering, München: W. Zuckschwerdt Verlag
5 Erickson, V.S. et al. (2001): Arm edema in breast cancer patients, in: J Natl Cancer Inst; 93, p. 96-113
Stage III
Progression of untreated lymphoedema eventually leads to elephantoid swellings. They may be accompanied by fibrosclerotic tissue changes, skin disorders (skin folds, papilloma) and further complications, such as lymph cysts and fistulas. The course of disease is usually associated with functional impairment, severe physical symptoms and increased psychological morbidity.

<table>
<thead>
<tr>
<th>Stages of breast cancer-related lymphoedema:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0: latent</td>
</tr>
<tr>
<td>• Asymptomatic, no swelling</td>
</tr>
<tr>
<td>• Evident damage to the lymphatic vessels</td>
</tr>
<tr>
<td>Stage I: reversible</td>
</tr>
<tr>
<td>• Doughy oedema (pitting oedema)</td>
</tr>
<tr>
<td>• Elevation reduces the swelling</td>
</tr>
<tr>
<td>Stage II: spontaneously irreversible</td>
</tr>
<tr>
<td>• Oedema with secondary tissue changes</td>
</tr>
<tr>
<td>• Elevation has no effect</td>
</tr>
<tr>
<td>Stage III: irreversible</td>
</tr>
<tr>
<td>• Elephantoid swelling with increasing fibrosclerosis</td>
</tr>
<tr>
<td>• Skin changes (skin folds, papilloma) and complications (lymph cysts and fistulas)</td>
</tr>
</tbody>
</table>

The lymphatic system:

1. Midsagittal watershed
2. Watershed above the clavicle
3. Confluence of the thoracic duct with the venous angle
4. Interaxillary anastomosis
5. Axillary lymph nodes
6. Thoracic duct
7. Chyle cistern
8. Lymph cistern
9. Transversal watershed
10. Axillo-inguinal anastomosis
11. Inguinal lymph nodes
12. Interinguinal anastomosis
13. Superficial cervical lymph nodes
Compression therapy with bandages and compression sleeves is effective at every stage of disease. If started early, it can prevent disease progression and the associated complications.

Six elements of oedema treatment

Compression therapy is the central element in CDT. It is supplemented by further components, such as manual lymphatic drainage, skin care, advice on exercise and nutrition and psychological counselling.

<table>
<thead>
<tr>
<th>Six elements of oedema treatment</th>
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</thead>
<tbody>
<tr>
<td>1. Manual lymphatic drainage</td>
<td>Mechanical stimulants (changing pressure) increase the pumping rate of the lymphatic vessels and enhance fluid drainage</td>
</tr>
<tr>
<td>2. Compression</td>
<td>For initial decongestion, short-stretch bandages are used. On a long-term basis, compression should be continued with flat-knit compression sleeves.</td>
</tr>
<tr>
<td>3. Exercise</td>
<td>Special gymnastics counteract the impaired mobility</td>
</tr>
<tr>
<td>4. Skin care / hygiene</td>
<td>Inflammation and other complications that impair lymphatic function and skin elasticity should be avoided.</td>
</tr>
<tr>
<td>5. Nutrition</td>
<td>Dietary changes and weight reduction may be indicated, as being overweight exacerbates the disease.</td>
</tr>
<tr>
<td>6. Motivation / Co-operation / Psychological counselling</td>
<td>Psychological counselling can help to reduce anxiety and promote motivation to ensure treatment compliance.</td>
</tr>
</tbody>
</table>

Stages of complex decongestive therapy (CDT)

<table>
<thead>
<tr>
<th>Stages of complex decongestive therapy (CDT)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Stage 1 (average 3 – 6 weeks)</td>
<td>Stage 2 (continuous)</td>
</tr>
<tr>
<td>Decongestion phase (possible hospitalisation, depending on severity) Manual lymphatic drainage with subsequent compression bandaging: twice daily</td>
<td>Maintenance phase Manual lymphatic drainage with subsequent compression bandaging: once to twice weekly + continuous use of compression sleeves with / without chest garment in flat-knit quality</td>
</tr>
<tr>
<td>Exercise</td>
<td>Exercise</td>
</tr>
<tr>
<td>Skin care / Hygiene</td>
<td>Skin care / Hygiene</td>
</tr>
<tr>
<td>Dietary advice (where appropriate, also advice on weight loss)</td>
<td>Dietary advice (healthy diet)</td>
</tr>
<tr>
<td>Psychological counselling (motivation)</td>
<td>Psychological counselling (treatment compliance)</td>
</tr>
</tbody>
</table>

Table 1: The six pillars of treatment

Table 2: stages of complex decongestive therapy (CDT)

Further pillars of treatment are exercise and gymnastics, diet and patient motivation. Skin care prevents minor lacerations and thus forestalls infection.

As soon as a satisfactory reduction in oedema has been achieved, an elastic sleeve (compression class ≥ CCL 2) should be prescribed for the second stage (maintenance phase). For the treatment of postoperative oedema of the chest area, appropriate compression shirts, bustiers or bodysuits are available.

The aim of this second phase is to maintain and further improve the oedema regression achieved during the decongestion phase.

Compression sleeves should usually be worn every day and even at night by some patients. A particularly stable quality of material is therefore important for the success of therapy. Supplementary products, such as napped therapeutic bandages or compression sleeves, are available to offer patients individual solutions.

or ribbed pressure pads can be incorporated into the compression sleeve. They break down and gradually reduce fibrosis.

Measures such as adequate skin care, a healthy diet and exercise performed with appropriate motivation should also not be neglected during the maintenance phase. Complications can be avoided by keeping the skin clean and maintaining its elasticity.

Mode of action of compression therapy

The efficacy of compression therapy with bandages and compression sleeves for the arm or chest is mainly based on three factors:

1. Increasing the tissue pressure reduces the ultrafiltration pressure – fewer waste products have to be eliminated by the lymphatic system.
2. At the same time, the efficacy of the muscle and joint pumps is improved, the lymph flow increases again and fibrosis is broken down. In addition, compression treatment compensates for the reduced skin and tissue pressure, which can result from tissue distension.
3. Following successful tissue decongestion, consistent use of compression sleeves prevents a renewed accumulation of lymph fluid. The compression reduces the amount of waste products that have to be eliminated by the lymphatic system. It also supports the veins and consequently improves the venous return to the heart. The compression bandage can break down any lymphostatic fibrosis that may be present. The compression increases lymphatic drainage. At the same time, the compression bandage supports and improves muscle and joint pump function, so that more lymph can drain away.

To ensure successful treatment, a consistent wearing of the compression sleeves, i.e. a high level of treatment compliance, is a decisive factor. It is therefore very important that they are comfortable to wear. To ensure this, medi compression sleeves are manufactured from skin-friendly, breathable materials that feel comfortable next to the skin. In specialist medical supply shops, patients are measured and the compression sleeves are subsequently made to measure.

And: medi compression sleeves are available in both classic styles and fashionable, sporty colours.

International expert committees recommend complex decongestive therapy as the first-choice treatment.

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6 Status 18.11.2013, 10:20 o’clock: http://www.dglymph.de/medizinische-informationen/ueber-die-kpe/behandlungsaufbau/
Incidence and risk factors

On average, 20 to 30% of breast cancer patients develop secondary lymphoedema. The individual lymphoedema risk is mainly determined by the type and extent of therapy. The incidence also increases over time after breast cancer treatment.

Reviews on the incidence

According to a review by Hayes and colleagues (2012), the incidence of breast cancer-related lymphoedema is often incorrectly estimated, as widely differing incidence rates were published in the past. The fluctuation range of the incidence rates, determined from eleven prospective studies (2007 – 2011), was between 0 and 94% (median = 20%).

One reason for this wide fluctuation range could be the methodological variability, as various procedures were performed to obtain the diagnosis, including bioimpedance measurements, volume tests or circumference analyses. The results were compared either with the healthy arm or with preoperative values.

The main difference is, however, to be found elsewhere: in addition to the varying intervals between surgery and the diagnosis of "lymphoedema", the studies mainly differ with regard to the patient populations examined, i.e. in the type and extent of previous treatment. Both factors have a decisive influence on the incidence of breast cancer-related lymphoedema.

Risk factors

Study data (1992 – 2013)

The type and extent of breast cancer treatment determine the incidence of lymphoedema (Figure 1): Thus, the review by Warren et al. reports an incidence rate of 24 to 49% following mastectomy; after lumpectomy it was lower, at 4 to 28%.

After axillary lymph node dissection, the number of lymph nodes removed correlates with the severity of lymphoedema; the relative risk increases by 1.11 (95% confidence interval [CI]: 1.05 – 1.18) per lymph node removed – in the scientific literature, incidences of up to 56% are described for breast cancer-related lymphoedema after axillary lymph node dissection.

Correspondingly, sentinel lymph node biopsy is associated with a markedly lower incidence. In a randomised study, patients had a much lower oedema risk after sentinel lymph node biopsy (5%) than after axillary lymph node dissection (13%; 95% CI: 0.23 – 0.60).

Incidence of breast cancer-related lymphoedema in 11 prospective studies

<table>
<thead>
<tr>
<th>Year</th>
<th>N</th>
<th>Diagnosis (method)</th>
<th>Time (month, group)</th>
<th>Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007²</td>
<td>50</td>
<td>Circumference¹</td>
<td>12 &gt; 18</td>
<td>11% 28%</td>
</tr>
<tr>
<td>2007³</td>
<td>60</td>
<td>Perometry¹</td>
<td>&gt; 18 SLB &gt; 18 ALD</td>
<td>0% 20%</td>
</tr>
<tr>
<td>2008⁴</td>
<td>211</td>
<td>Bioimpedance,</td>
<td>6 12 &gt; 18</td>
<td>11% 8 – 11% 12 – 15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>circumference¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008⁵</td>
<td>347</td>
<td>Circumference¹</td>
<td>6 12 &gt; 18</td>
<td>9 – 16%</td>
</tr>
<tr>
<td>2008⁶</td>
<td>263</td>
<td>Circumference¹b</td>
<td>&gt; 18 L &gt; 18 RM</td>
<td>5% 16%</td>
</tr>
<tr>
<td>2008⁷</td>
<td>936</td>
<td>Circumference¹</td>
<td>6 12</td>
<td>9% 12%</td>
</tr>
<tr>
<td>2010⁴</td>
<td>191</td>
<td>Circumference¹</td>
<td>&gt; 18</td>
<td>12%</td>
</tr>
<tr>
<td>2010⁵</td>
<td>137</td>
<td>Perometry¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010¹⁰</td>
<td>213</td>
<td>Circumference¹,</td>
<td>6 12 &gt; 18 (to 60)</td>
<td>11 – 44% 22 – 66% 29 – 94%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Perometry¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011¹¹</td>
<td>49</td>
<td>Circumference¹</td>
<td>&gt; 18</td>
<td>18%</td>
</tr>
<tr>
<td>2011¹²</td>
<td>223</td>
<td>Circumference¹</td>
<td>&gt; 18 SLB &gt; 18 ALD</td>
<td>5% 35%</td>
</tr>
</tbody>
</table>

SLB = Sentinel lymph node biopsy; ALD = Axillary lymph node dissection; L = Lumpectomy; RM = Radical mastectomy; a = difference healthy-ill, b = difference pre- and postoperative
Axillary radiotherapy appears to constitute a particular risk factor (Figure 2). One review reports that adjuvant axillary radiotherapy more than doubles the probability of breast cancer-related lymphoedema – from a mean of 17% (range 6–39%) to 41% (range 21–51%). A possible cause under discussion is radiation-induced fibrosis.

A current study from 2013 identified adjuvant chemotherapy as the third independent risk factor besides the number of lymph nodes removed and supraclavicular irradiation. The authors determined that these three risk factors apparently have a supra-additive effect: during the 5-year observation period, the presence of two treatment-associated risk factors increased the probability from 3% (0–1 risk factors) to 19%. In the presence of all three factors, the risk was 38% (p < 0.001).

**Incidence over time**

"Post-breast cancer lymphedema – incidence increases from 12 to 30 to 60 months" (2010)

According to this study, the median incidence rate of breast cancer-related lymphoedema increases in proportion to the length of postoperative follow-up. Participating in the study was a total of 236 breast cancer patients (57 [30–89] years of age), in whom either sentinel lymph node biopsy (SLB 43%) or axillary lymph node dissection (ALD 30%) had been performed during breast cancer surgery (SLB + ALD: 11%).

The diagnosis was based on various criteria: a change in arm circumference of ≥ 2 cm, a change in arm volume of ≥ 200 ml. Further findings: a sensation of heaviness and swelling according to information supplied by the patients. All measurements were taken pre- and postoperatively (6–60 months).

According to the examination method, the incidence rate of breast cancer-related lymphoedema increased from 44% (95% CI: 37–51) after 6 months to 95% (95% CI: 87–98) after 60 months (determination of the circumference) and from 24% (95% CI: 19–31) to 83% (95% CI: 72–91) (determination of the volume).
Conclusion

Long-term analysis thus shows that the incidence of breast cancer-related lymphoedema continues to increase, even years after treatment (Figure 3).

Recommendation for clinical practice

Even if breast cancer surgery had been performed quite some time previously, the risk of breast cancer-related lymphoedema should always be considered. The following factors play an important role in the probability of lymphoedema and should be particularly heeded in clinical practice:

- adjuvant radiotherapy
- axillary lymph node dissection (number of lymph nodes removed)
- mastectomy (vs lumpectomy)
- other: adjuvant chemotherapy

Figure 3: Incidence of breast cancer-related lymphoedema over time (up to 60 months postoperatively). The diagnosis was determined by measuring either the circumference (cm) or volume (c) (Mo = month).

References

3. Celebioglu, F. et al. (2007): Lymph drainage studied by lymphoscintigraphy in the arms after sentinel node biopsy compared with axillary lymph node dissection following conservative breast cancer surgery, in: Acta Radiol; 48, p. 488-495
Effective reduction of the oedema volume

Current studies have investigated the extent to which compression therapy can reduce oedema.

Six international studies (2004 – 2011) serve as examples to confirm the reduction in oedema volume through the use of complex decongestive therapy (CDT). In these studies, CDT is based on the four elements of manual lymphatic drainage with subsequent compression with short-stretch bandages (particularly during the decongestion stage), continuous care with flat-knit compression sleeves during the maintenance phase and skin care and physiotherapy. The following overview shows the average reduction in oedema at the end of treatment.

Recommendation for clinical practice

The efficacy of CDT in the reduction of lymphoedema volume was demonstrated in numerous studies. International expert committees recommend CDT as the first-choice treatment.

<table>
<thead>
<tr>
<th>Study</th>
<th>Treatment</th>
<th>Oedema reduction (av.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008¹</td>
<td>12 weeks MLD (3 x/week)</td>
<td>415 ml</td>
</tr>
<tr>
<td></td>
<td>Compression sleeves (10 – 20 mmHg)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n = 62</td>
<td></td>
</tr>
<tr>
<td>2004²</td>
<td>2 – 4 weeks decongestion (MLD 5 x/week)</td>
<td>138 ml (after decongestion)</td>
</tr>
<tr>
<td></td>
<td>Compression sleeves worn for 1 year (daily)</td>
<td>100 ml (after 1 year)</td>
</tr>
<tr>
<td></td>
<td>n = 20</td>
<td>1.5 cm (after decongestion)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 cm (after 1 year)</td>
</tr>
<tr>
<td>2007³</td>
<td>2 – 4 weeks decongestion (MLD 5 x/week)</td>
<td>20.6 % excess volume (after 1 month)</td>
</tr>
<tr>
<td></td>
<td>Compression sleeves worn for 6 months (24 h)</td>
<td>76 % excess volume (after 6 months)</td>
</tr>
<tr>
<td></td>
<td>n = 53</td>
<td></td>
</tr>
<tr>
<td>2006⁴</td>
<td>MLD, skin care, exercise</td>
<td>404 ml</td>
</tr>
<tr>
<td></td>
<td>Compression sleeves (during the day)</td>
<td>23 % excess volume</td>
</tr>
<tr>
<td></td>
<td>Compression bandages (at night)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Av. duration of therapy 11.8 ± 3.3 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n = 357</td>
<td></td>
</tr>
<tr>
<td>2007⁵</td>
<td>11 days of decongestion (MLD 5 x/week)</td>
<td>407 ml (after decongestion)</td>
</tr>
<tr>
<td></td>
<td>Compression sleeves worn for 1 year</td>
<td>329 ml (after 6 months)</td>
</tr>
<tr>
<td></td>
<td>(20 – 36 mmHg or 15 – 19 mmHg)</td>
<td>323 ml (after 1 year)</td>
</tr>
<tr>
<td></td>
<td>n = 53</td>
<td></td>
</tr>
<tr>
<td>2011⁶</td>
<td>14 days of decongestion (MLD 5 x/week)</td>
<td>601 ml</td>
</tr>
<tr>
<td></td>
<td>Compression sleeves worn for an avg. of 28 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(15 – 19 mmHg, 20 – 36 mmHg, &gt; 36 mmHg)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n = 682</td>
<td></td>
</tr>
</tbody>
</table>

MLD = Manual lymphatic drainage with subsequent bandaging; additional treatment: skin care and exercise; av. = average.

Continuous improvement in quality of life

What does complex decongestive therapy achieve? It effectively reduces oedema volume and improves the overall quality of life. Specific areas of everyday life are continuously improved, particularly in long-term treatment (less pain, more vitality).

The study by Karadibak et al. shows that during the decongestion phase, the oedema volume can be reduced and the general quality of life significantly improved. A total of 62 women (56.7 ± 12.1 years of age) were enrolled in the study. They developed lymphoedema following treatment with axillary lymph node dissection.

The 12-week treatment included manual lymphatic drainage according to Földi with subsequent compression bandaging (3 x weekly) and provision of individually fitted compression sleeves (10 – 20 mmHg).

In addition to the reduction in oedema volume from 925 ml to 510 ml, the authors, using the FACT-B+ questionnaire found a significant effect on various areas of quality of life (p < 0.05). The quality of life correlated inversely with the severity of oedema (p < 0.05).

| Correlation between the severity of oedema and quality of life (Pearson’s correlation coefficient) |
|----------------------------------|------------------|------------------|
| Quality of life                  | before treatment | after treatment  |
| physical                        | -0.556           | -0.454           |
| social/family                   | -0.547           | -0.399           |
| emotional                       | -0.586           | -0.410           |
| functional                      | -0.656           | -0.625           |
| other factors                   | -0.710           | -0.687           |

Conclusion: The severity of oedema correlates inversely with quality of life. The reduction in oedema volume during the 12-week treatment phase is thus very important with regard to the patients’ quality of life.
A further study\(^4\) shows that complex decongestive therapy can also improve patients’ long-term quality of life. Participating in this study was a total of 53 breast cancer patients (51.0 ± 6.7 years of age), who had developed breast cancer-related lymphoedema after surgery (64.2 % with subsequent radiotherapy).

All the patients were treated with complex decongestive therapy. The 2- to 4-week decongestion was performed with manual lymphatic drainage and subsequent compression garments (short-stretch bandages), compression sleeves, exercise and skin care. During the following 6-month maintenance phase, compression sleeves were worn daily (24 h). Lymphatic drainage was continued in the form of self-massage.

The oedema volume reduced during the decongestion phase and, despite a renewed increase, remained significantly reduced during the maintenance phase compared to the baseline value (p < 0.05).

In parallel to this, the patients’ quality of life improved significantly (SF36 questionnaire): This was particularly observed in the areas of physical functioning (6 months, p = 0.004), physical role functioning (6 months, p = 0.001), psychological well-being (1 month, p = 0.004) and general health perceptions (6 months, p = 0.02) (Figure 1).

Overall, the reduction in oedema volume through complex decongestive therapy was associated with improved physical functioning, vitality, reduction in bodily pain and improved general health (1 and 6 months, p < 0.05; Spearman correlation).

**Conclusion**

Complex decongestive therapy can significantly reduce the oedema volume during the decongestion phase and stabilise it during the maintenance phase. During the maintenance phase, the quality of life improves continuously.

**Recommendation for clinical practice**

Complex decongestive therapy can reduce the oedema volume in the short term and maintain the success of therapy in the long term, together with a continuous improvement in the quality of life. Tell your affected patients about the possible treatment success of complex decongestive therapy. This can help to improve treatment compliance.

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**Figure 1: Relative change (%) in oedema volume and various areas of quality of life.**

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\(^1\) Karadibak, D. et al. (2008): Prospective trial of intensive decongestive physiotherapy for upper extremity lymphedema, in: J Surg Oncol; 97, p. 572-577


Which factors promote the successful implementation of complex decongestive therapy? An early start to treatment is the most important factor, as the duration of treatment and the severity of oedema decisively affect the success of complex decongestive therapy.

In this study with 357 breast cancer patients (53 ± 11 years of age), initial decongestive treatment was followed by manual lymphatic drainage, compression, skin care and physiotherapy in accordance with the usual international guidelines. During the subsequent maintenance phase, both compression sleeves (during the day) and bandages (at night) were used.

The oedema volume prior to treatment (average 1067 ± 622 ml) correlated with the body mass index (BMI) and the duration of disease: the oedema excess volume increased by 47 ± 5.9 ml for every one-point increase in BMI and by 16.5 ± 4.8 ml for every extra year.

Furthermore, the BMI and, in particular, the duration of disease were the only valid predictors of a successful reduction in oedema during the complex decongestive therapy: the shorter the duration of the oedema, the more successful the treatment (Figure 1).

The severity of the lymphoedema at the beginning of treatment also affects the success of therapy, as shown by a current study (2013) from Taiwan. In this study, complex decongestive therapy reduced the oedema volume by approximately 50%. This reduction correlated not only with the duration of disease prior to treatment, but also with the stage of oedema.

Conclusion
Intensive decongestive treatment reduces the oedema volume extremely effectively. The duration of the oedema and its severity at the start of treatment affect the success of therapy – it is therefore advisable to start treatment early.

Recommendation for clinical practice
Early diagnosis is of decisive importance for optimally successful treatment. The patient’s subjective reported symptoms should therefore always be included in the assessment - in addition to the basic diagnostic measures, measurement of volume and circumference and additional instrumental diagnostic tests for lymphoedema. The reason: subjective symptoms can be an early warning sign of initial oedema development.

Frequently cited complaints:
- A sensation of swelling and heaviness
- Numbness
- Warmth
- Pain

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Figure 1: Oedema volume before (□) and after (■) complex decongestive therapy – Dependence on the duration of disease

Importance of an early start to treatment
Importance of treatment compliance

In many studies, the mean oedema volume increased again slightly during a long-term observation period. Lack of treatment compliance was identified as the main risk factor for a renewed volume increase during the maintenance phase.

A study from 2007 underlines the importance of continuing compression therapy consistently during the maintenance phase. In this study, a total of 537 patients (62 [34 – 91] years of age) with breast cancer-related lymphoedema underwent complex decongestive therapy: decongestion phase (11 days) with manual lymphatic drainage (30 minutes, 5 times a week) and subsequent compression (24 h); maintenance phase (12 months) with individually fitted compression sleeves (86 %: 20 – 36 mmHg; 14 %: 15 – 19 mmHg).

During the decongestion phase, the oedema volume was reduced from 1,054 ± 633 ml to 647 ± 351 ml. During the maintenance phase, the volume increased slightly, by 78 ml and 84 ml after 6 and 12 months, respectively (Figure 1).

The proportion of patients, in whom the oedema volume increased again by more than 10 % during the maintenance phase was 52 %. In 20 % of patients, the oedema volume remained stable and in 28 % it continued to decrease (Figure 2, top).

Of those patients in whom a renewed volume increase was observed, 79 % had abstained from a continuous use of compression sleeves (short-stretch bandages: 71 %; manual lymphatic drainage: 52 %). This shows that consistent application of compression therapy alone can be sufficient to protect against a renewed volume increase (Figure 2, bottom). The authors calculated that consistent application of compression sleeves is associated with an additional volume reduction of 118 ml (bandages: 99 ml).

Conclusion

During the maintenance phase, consistent use of compression therapy is absolutely essential, in order to stabilise the result permanently (short-stretch bandages and compression sleeves).

Figure 1. Mean course of the oedema volume before and after complex decongestive therapy (follow-up to 12 months).

Figure 2. top: Oedema volume during the maintenance phase. Patients (%) with an increase in oedema volume (> 10 %), with a stable oedema volume or with a volume reduction. Bottom: Poor treatment compliance as a risk factor for a renewed volume increase. The risk was greatest if the patients did not wear compression sleeves (RR = relative risk; CI = confidence interval).

Risk factors for failure of therapy during the maintenance phase

In this study², Vignes et al. investigated which factors can lead to a failure of therapy during the maintenance phase. In this prospective cohort study, 682 breast cancer patients (62 [55–71] years of age) were enrolled, who had to undergo treatment for secondary lymphoedema. The treatment (complex decongestive therapy) consisted of a 2-week decongestion phase and a maintenance phase with a mean duration of 28 months. During the maintenance phase, individually fitted, class 2 compression sleeves (15 – 19 mmHg) were prescribed for 9% of patients, class 3 (20 – 36 mmHg) for 90% and class 4 (> 36 mmHg) for 1% of patients.

The purpose of the study was to determine the reasons for therapy failure during the maintenance phase (defined as a volume increase of ≥ 50% compared with that at the end of the decongestion phase). In this study, the authors confirmed that therapy with compression sleeves and bandages alone can significantly reduce the risk of therapy failure (p = 0.004), i.e. the risk of a renewed increase in oedema volume of more than 50%. By contrast, patients who underwent only manual lymphatic drainage during the maintenance phase showed an increased risk of recurrence (Figure 3).

Conclusion
Poor treatment compliance (compression treatment) is the most important risk factor for a renewed increase in oedema volume.

Recommendation for clinical practice
Tell your patients about the importance of consistent treatment compliance. Modern compression products help to support patients’ treatment compliance.

Figure 3. Risk of therapy failure (volume increase > 50%), if patients received only manual lymphatic drainage, only compression sleeves, or compression sleeves and bandages (hazard ratio [95% CI]).

The authors of international studies are of the opinion that the risk of breast cancer-related lymphoedema is not adequately recognised and that the disease is consequently not sufficiently treated.\(^1\) This is also shown by studies on the care situation of patients with breast cancer-related lymphoedema in Germany.\(^3\)\(^,\)\(^5\)

### Insurance data from 2008

A review conducted by the University of Bremen shows that almost two thirds of patients affected do not receive sufficient care.\(^4\) In Bremen, out of 812 women with breast cancer-related lymphoedema, only 24.4 % received both manual lymphatic drainage and compression therapy. 3.8 % received only compression therapy. A large proportion, 46.2 %, received only manual lymphatic drainage. 25.6 % of the patients were not treated at all (Figure 1).

**Operation period 2000 – 2005**

Complex decongestive therapy is recognised as an effective procedure in breast cancer-related oedema of the arm and chest. The treatment is already indicated from stage I.\(^5\),\(^6\) However, a retrospective evaluation of patient data from Jena (2000 – 2005)\(^5\) shows that 45 % of patients with stage I lymphoedema received no compression therapy - and thus received insufficient therapeutic care. The patients only received adequate compression treatment as the oedema became increasingly severe.

**In patients with breast cancer-related lymphoedema, compression therapy should be started at an early stage – in practice, however, patients often only receive the correct therapy at an advanced stage.**

The reasons for this underprovision are manifold: in addition to unclear indication standards, the fears of the affected women certainly also play a decisive role. Compression sleeves are perceived as stigmatising or disfiguring. The daily donning and doffing of the compression sleeve is also thought to be time-consuming and the sleeve material uncomfortable.

### Recommendation for clinical practice

Patients should therefore not only be informed about the prospects for success of compression therapy, they should also be advised on the modern products of compression therapy.

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\(^3\) GEK. GEK-Heil- und Hilfsmittel-Report (2008): Schriftenreihe zur Gesundheitsanalyse (64)


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Figure 1: Care of breast cancer-related lymphoedema in 812 patients in Bremen (acc. to: GEK-Heil- und Hilfsmittel-Report 2008\(^3\)).
The efficacy of compression therapy in the treatment of breast cancer-related lymphoedema is considered proven.1-4 The prerequisite is a high degree of treatment compliance on the part of patients. Compression products from medi support treatment compliance – and can thus contribute to the long-term success of treatment.

One of the most frequent concomitant symptoms of breast cancer surgery is breast cancer-related lymphoedema.5 Approximately 20 to 30% of patients develop lymphoedema of the arm or chest following breast cancer treatment.5,7 This risk persists even in patients whose breast cancer surgery had been performed quite some time previously.7 Treatment-related factors that can increase the individual risk include the type of treatment (adjuvant radiotherapy, axillary lymph node dissection, mastectomy) and the extent of treatment (number of lymph nodes extirpated).

The efficacy of compression therapy, either as an individual therapy form or in combination with other measures, is considered proven.1-4 In many international studies, complex decongestive therapy caused a long-term reduction in oedema volume, reduced or eradicated pain and improved quality of life.

Complex decongestive therapy can be used at every stage of disease, in order to prevent further progression and reduce oedema.1

The prerequisite for successful treatment is a high degree of treatment compliance by patients. A thorough patient briefing and, if necessary, psychological counselling can therefore be advisable, in order to support treatment compliance. medi provides oedema care that is adapted to the indication. The garments are very comfortable to wear and are available in aesthetic designs, which promotes treatment compliance and thus contributes to the long-term success of therapy.

**Product properties**
- medically effective in the treatment of breast cancer-related lymphoedema
- oedema care adapted to the indication
- specific products for every stage
- support treatment compliance, due to excellent comfort in wear (precise anatomical fit, breathable, skin-friendly materials that are pleasant to wear next to the skin)
- promote acceptance of treatment thanks to their modern appearance (individual selection of colours and materials)
- complete service available: donning aids, skin care products, information material

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**Product overview: Use of medi compression products in breast cancer-related lymphoedema**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
</table>
| I – spontaneously reversible | During the decongestion phase: short-stretch bandages  
During the maintenance phase: mediven esprit, mediven 550 arm compression sleeves |
| II – spontaneously irreversible | During the decongestion phase: short-stretch bandages  
During the maintenance phase: mediven esprit, mediven 550 arm compression sleeves |
| III – severe form | During the decongestion phase: short-stretch bandages  
During the maintenance phase: mediven 550 arm compression sleeves |

**Supporting products**
- To soften tissue induration: medi lymph pads
- For cleansing the skin and maintaining its elasticity: skin care products

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1 GEK. GEK-Heil- und Hilfsmittel-Report (2008): Schriftenreihe zur Gesundheitsanalyse (64)
7 Deutsche Krebsgesellschaft e.V. (2008): Interdisziplinäre S3-Leitlinie für die Diagnostik, Therapie und Nachsorge des Mammakarzinoms, Germering, München: W. Zuckschwerdt Verlag
For improved treatment compliance and a better quality of life

Oedema therapy from medi.

Every treatment of lymphatic disease is as individual as your patients. medi compression sleeves are of proven efficacy, thanks to a variety of features and options:
- Incorporation of pads, top band pieces or zips
- Anatomically slanted finished edges
- Comfortably soft top edge
- Skin-friendly, antibacterial knitted fabric that is pleasant to wear on the skin

<table>
<thead>
<tr>
<th>Features</th>
<th>Benefits for your patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Smooth knitted fabric</td>
<td>- Optimal provision for individual requirements</td>
</tr>
<tr>
<td>- Many combination options with special extras</td>
<td>- Garment that is appropriate to the indication</td>
</tr>
<tr>
<td>- Numerous varieties for double and multipart garments</td>
<td>- Fashionable variety: 8 colours and 3 patterns</td>
</tr>
<tr>
<td>- Recommended for normal to firm connective tissue</td>
<td></td>
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</tbody>
</table>

For oedema up to Stage II

<table>
<thead>
<tr>
<th>Features</th>
<th>Benefits for your patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Highest working pressure</td>
<td>- Optimal provision for individual requirements</td>
</tr>
<tr>
<td>- Over 2,100 combination options with special extras</td>
<td>- Garment that is appropriate to the indication even in the case of severe oedema</td>
</tr>
<tr>
<td>- Numerous varieties, such as arm cuffs for double and multipart garments</td>
<td>- Fashionable variety: 8 colours and 3 patterns</td>
</tr>
<tr>
<td>- Recommended for soft to firm connective tissue</td>
<td></td>
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</tbody>
</table>

For oedema up to Stage III

For your fashion-conscious patients, mediven esprit and mediven 550 arm are available in fashionable colours and patterns. For more information, go to www.medi-doctors.com
Two factors are of decisive importance for the effective treatment of breast cancer-related lymphoedema:
1. Starting treatment at an early stage (complex decongestive therapy with compression),
2. Reinforcing treatment compliance (information and advice on compression products).

Even if breast cancer surgery had been performed quite some time previously, the risk of breast cancer-related lymphoedema should always be considered. In particular, the type and extent of treatment can increase the individual risk (adjuvant radiotherapy, axillary lymph node dissection, mastectomy).

In addition to the basic diagnostic methods, the subjective symptoms reported by patients are always important in obtaining an early diagnosis. The following symptoms may be early indications of oedema development: a sensation of swelling and heaviness, numbness, warmth, pain.

Inform the affected patients about the potential success of treatment with complex decongestive therapy – and about the need for long-term continuous compression therapy. A specific briefing on modern compression products can help to dispel patients’ fears and to improve their acceptance of treatment.

We also provide edited information for patients about breast cancer-related lymphoedema and simple tips on how they can support oedema treatment.

**medi Tip:**
You can order free documentation for yourself and your practice team on phone +49 (0)921 912 1371.