World Physiotherapy
Europe region

Factsheet –
The Role of Physiotherapy in Cancer-Associated Secondary Lymphedema

Cancer Working Group

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FACTSHEET – THE ROLE OF PHYSIOTHERAPY IN CANCER-ASSOCIATED SECONDARY LYMPHEDEMA

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1. WHAT IS SECONDARY LYMPHEDEMA ASSOCIATED WITH CANCER?

It is a frequent side effect of cancer and its treatments, as a result of mechanical damage to the lymphatic system (e.g. surgery and radiotherapy), creating insufficiency and impaired lymph transport[1], or as a result of physiological changes (e.g. capillary leakage due to taxane-based chemotherapy), producing excess extracellular fluid and proteins in the interstitial space, which leads to swelling of the affected body part and chronic inflammation[2]. The proteins are hydrophilic and when they do not get removed from the interstitial space, they attract more fluid to the interstitial space, worsening swelling[3].

Potential risk factors, supported by the scientific evidence are a body mass index above 25 kg/m2, a high number/ratio of lymph nodes dissected, infection, the extent of surgery (iatrogenic damage) and/or the combination of surgery with both chemotherapy and radiotherapy[1].

2. WHICH ASSESSMENT TOOLS DO PHYSIOTHERAPISTS HAVE TO EVALUATE LYMPHEDEMA?

There are different methods for assessing the volume and content of a lymphedematous body part. These are especially important for monitoring treatment-related progress, so it is important to have baseline measurements (ideally before any cancer treatment):

2.1 Volumetrics

Volumetrics are used to measure/calculate the volume of the edematous body segment to evaluate the progression of the swelling and the effectiveness of the Complex Decongestive Therapy (CDT) or Complex Physical Therapy (CPT) with water displacement method, perimetrics or opto-electronic volumetrics.

- **Water displacement method (gold standard):** Insertion of the extremity into a water-filled basin can be used, based on the Archimedes' principle [4,5], through which the arm will displace its own volume of water.

- **Perimetrics:** The measurement of the circumferences is carried out with a calibrated tape measure with a spring at constant tension[6] specific protocols for performing standardised measurements based on anatomical reference points[7].

- **Opto-electronic volumetrics (Perometer[8])**: It accurately assesses limb volume changes through infrared light and advanced imaging technology that allows three-dimensional images of the affected limb to be captured and compared over time. It is a technique with great validity, even in small changes in volume.

2.2 Segmental body composition

Segmental body composition is used to define the content of the different tissues, more specifically extracellular fluid (edema) with Bio-impedance analysis (BIA), Bio-impedance spectroscopy (BIS) and/or Tissue dielectric constant (TDC):

- **Bioimpedance analysis/spectroscopy (BIA- BIS)[9]:** They are reliable quantitative assessment methods that use electrical impedance to assess the composition of body tissues, allowing the assessment of both the presence and severity of lymphedema. They are especially valid for assessing changes in extracellular fluid content, accurately distinguishing between affected and unaffected limbs[10].

- **Tissue dielectric constant (TDC):** It is an emerging non-invasive quantitative method that evaluates the dielectric properties of tissues using electromagnetic waves, giving information about the accumulation of liquids. Current studies have already shown promising results on the validity of this technique, which shows correlations with the severity of edema[11].

In addition, through medical images (such as fluorescence lymphography with indocyanine green), the functioning of the lymphatic vessels can be evaluated, allowing mapping for manual lymphatic drainage by the physiotherapist.

3. HOW CAN PHYSIOTHERAPY PREVENT LYMPHEDEMA?

Educating patients on:

- a healthy and active lifestyle;
- wound and skin care, especially to prevent infections;
- the importance of prospective surveillance models;
- the risk factors and preventive measures.
- In some cases, it is recommended to wear a compression garment preventively, e.g. long aeroplane flights.

Evidence shows that Manual Lymphatic Drainage (MLD) can have a preventive effect on the onset of cancer-related lymphedema. Extracellular fluid and proteins are collected and reabsorbed from the interstitial space and lymphangion contractions are activated and intensified to transport lymph fluid to the lymph nodes and eventually into the bloodstream[3]. Inactive anastomosis (e.g., interaxillary) can also be treated through MLD, as it allows lymphatic fluid to be redirected to healthy, intact lymphatic structures in adnexal parts of the body and newly formed collateral pathways[12].

Recently, scientific evidence is beginning to show the role of physical exercise as a preventive measure for lymphedema[13].

More resources:
https://issuu.com/lymphnet/docs/healthyhabits
https://www.cancer.org/content/dam/CRC/PDF/Public/8902.00.pdf
https://www.macmillan.org.uk/cancer-information-and-support/impacts-of-cancer/lymphoedema/reducing-your-risk-of-lymphoedema
https://lymphaticnetwork.org/

4. HOW TO MANAGE LYMPHEDEMA FROM PHYSIOTHERAPY?

The physiotherapist is first-in-line for cancer related lymphedema screening, intake and management. Traditionally, conservative treatment of cancer related lymphedema by the physiotherapist is called Complex Decongestive Therapy (CDT) or Complex Physical Therapy (CPT) and consists of four pillars:

1) manual lymphatic drainage, with evidence-based techniques (e.g. method of Leduc).
2) compression therapy (short stretch bandaging, compression garments and/or intermittent pneumatic compression)
3) skin and wound care
4) physical exercise

CDT/CPT contains two phases:

1) **The reduction phase** (about 6 weeks): to reduce the volume with manual lymphatic drainage and short-stretch bandaging mainly.
2) **The maintenance phase:** to stabilise the volume reduction with manual lymphatic drainage and compression garments mainly.

Skin and wound care and physical exercise are important in every phase.

In most cases, if, after six months to one year of intensive CDT/CPT by a specialised physiotherapist, no satisfying results are obtained, patients should be referred for further examination (in general medical imaging) and to look at (supra)microsurgical options like lympho-venous anastomoses, lymph node transplant or lipo-lympho-suction. If the patient is a candidate for surgical treatment, the perioperative role of the physiotherapist is of utmost importance.

5. DO'S AND DON'TS, RED FLAGS

- Be careful with the use of diuretics: the fluid will be excreted, but the proteins will be left behind and the long-term results could be worse (because the proteins are hydrophilic).

- MLD makes it easier for fluid and proteins to enter the lymphatic system to be evacuated from the oedematous area.

- Fibrotic changes may occur in a lymphedema region that are clinically present as tissue hardening. Where they occur, the short-stretch bandage can soften the tissue, but this condition is not always reversible or fixable.

- Lymphedema care should be multidisciplinary.

- Differential diagnosis with vascular oedema, lipoedema, combined forms of oedema, and others is crucial, especially in lower limbs.

- Related to breast cancer surgery, particularly axillary lymph node dissection, axillary membrane syndrome sometimes appears, with visible and palpable "cords" or taut bands appearing in the underarm area (axilla) area and sometimes the arm. Its pathophysiology is related to a "lymphatic web" that forms to prevent lymphatic fluid from continuing to flow from the damaged lymphatic vessels, causing the distal part of the lymphatic vessel to dry out and harden. There is insufficient evidence on treatment by the physiotherapist, so caution is required.

- In the presence of infection (lymphangitis or erysipelas) of the lymphatic and/or oedematous system: refer the patient for intravenous antibiotics immediately, and do not perform CPT/CDT.

MORE INFORMATION

https://www.cancerresearchuk.org/about-cancer/coping/physically/lymphoedema-and-cancer/treating/exercise
https://www.breastcancer.org/treatment-side-effects/lymphedema/treatments/complete-decongestive-therapy
https://www.cancerresearchuk.org/about-cancer/coping/physically/lymphoedema-and-cancer/treating/massage-manual-lymphatic-drainage/about
https://www.macmillan.org.uk/cancer-information-and-support/impacts-of-cancer/lymphoedema/managing-lymphoedema-with-exercise
https://www.breastcancer.org/treatment-side-effects/lymphedema/reducing-risk/exercise
https://www.youtube.com/watch?v=W7cFB78EWVk
https://lymphaticnetwork.org/

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REFERENCES

1. Executive Committee of the International Society of Lymphology. The diagnosis and treatment of peripheral lymphedema: 2020 Consensus Document of the International Society of Lymphology. *Lymphology*. 2020;53(1):3-19.

2. Rockson S, Keeley V, Kilbreath S, Szuba A, Towers A. Cancer-associated secondary lymphoedema. *Nat Rev Dis Primers*. 2019;5:22. doi:10.1038/s41572-019-0072-5

3. Földi M, Földi E. Conservative Treatment of Lymphedema. In: ; 2019:469-478. doi:10.1201/9780429276200-33

4. Taylor R, Jayasinghe U, Koelmeyer L, Ung O, Boyages J. Reliability and Validity of Arm Volume Measurements for Assessment of Lymphedema. *Phys Ther*. 2006;86:205-214. doi:10.1093/ptj/86.2.205

5. Sagen A, Kåresen R, Skaane P, Risberg M. Validity for the Simplified Water Displacement Instrument to Measure Arm Lymphedema as a Result of Breast Cancer Surgery. *Arch Phys Med Rehabil*. 2009;90:803-809. doi:10.1016/j.apmr.2008.11.016

6. Mayrovitz H. Noninvasive Measurements of Breast Cancer-Related Lymphedema. *Cureus*. 2021;13. doi:10.7759/cureus.19813

7. Sander A, Hajer N, Hemenway K, Miller A. Upper-Extremity Volume Measurements in Women With Lymphedema: A Comparison of Measurements Obtained Via Water Displacement With Geometrically Determined Volume. *Phys Ther*. 2003;82:1201-1212. doi:10.1093/ptj/82.12.1201

8. Adriaenssens N, Buyl R, Lievens P, Fontaine C, Lamote J. Comparative study between mobile infrared optoelectronic volumetry with a Perometer and two commonly used methods for the evaluation of arm volume in patients with breast cancer related lymphedema of the arm. *Lymphology*. 2013;46:132-143.

9. Torgbenu E, Luckett T, Buhagiar M, Phillips J. Guidelines Relevant to Diagnosis, Assessment, and Management of Lymphedema: A Systematic Review. *Adv Wound Care (New Rochelle)*. 2022;12. doi:10.1089/wound.2021.0149

10. Cornish B, Chapman M, Hirst C, et al. Early diagnosis of lymphedema using multiple frequency bioimpedance. *Lymphology*. 2001;34:2-11.

11. Mayrovitz H, Weingrad D, Davey S. Tissue Dielectric Constant (TDC) Measurements as a means of characterizing localized tissue water in arms of women with and without breast cancer treatment related lymphedema. *Lymphology*. 2014;47:142-150.

12. Leduc O. Drainage lymphatique selon la méthode Leduc. R. Barbieux, O. Leduc. EMC, Kinésithérapie-Médecine physique-réadaptation. Vol 34, n°4, Octobre 2021. *EMC - Kinésithérapie - Médecine physique - Réadaptation*. 2021;vol 34.

13. Sandra C Hayes, Ben Singh, Hildegard Reul-Hirche. The Effect of Exercise for the Prevention and Treatment of Cancer-Related Lymphedema: A Systematic Review with Meta-analysis. *Med Sci Sports Exerc*. Published online 2022.