

# MANUAL LYMPHATIC DRAINAGE IN PATIENTS WITH LYMPHOEDEMA AFTER NECK DISSECTIONS

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## ABSTRACT

**Introduction.** Modern medicine with its advances tries to tackle the issues associated with the increasing number of squamous cell carcinomas of head and neck (HNSCC). The availability of advanced multi-modality treatment techniques significantly prolong the lifespan of patients, but at the same time, the changes occurring after primary and adjunctive treatment can significantly impair patient's functioning, due to lymphoedema.

**Aim of study.** The aim of study is to evaluate the impact of manual lymphatic drainage on post-treatment lymphoedema reduction in head and neck cancer patients

**Materials and methods.** The study was conducted on a group of 20 HNSCC patients (age ranging from 29-82) suffering from post-surgical lymphoedema. The patients were subjected to the measurement of their lymphoedemas at the beginning and at the end of therapy.

**Results.** Assessment of application of the manual lymphatic drainage in the group of patients with post-surgery lymphatic changes showed that the change is statistically significant. Mean sizes of the circumference in group of patients changed from 27,13 before, to 25,75 cm after the therapy.

**Conclusions.** Manual lymphatic drainage techniques can be a way of alleviating the side-effects of oncological treatment applied in head and neck cancers. Despite the fact that patients suffer visible anatomical damage, the current healthcare system fails to provide them with specialized physiotherapy. With a specialized and complex therapy, patients can expect that lymphoedema will be reduced. Moreover, by reducing the functional barriers, patients' quality of life can be improved.

**Key words:** head and neck cancer, oncology, manual lymphatic drainage, post-surgical lymphoedema, chronic lymphoedema.

## Introduction

Epidemiological studies show that head and neck cancers account for 12,6% of all cancers diagnosed in Poland. Tumors are more common in men than in women, however, we observe increased occurrence of cancers in women in recent years, which is attributed to an increasing number of smokers in this demographic. Recent findings show that the age of patients, who are diagnosed with these tumors, gets lower. In the smoking population, the risk of developing head and neck cancers is 15-20 times higher than in the non-smoking population [1, 2]. Additionally, the exposure to cigarette smoke and the substantial alcohol intake are said to be linked to the risk of developing cancer. Human papilloma virus (HPV), mainly HPV16 has been identified as a causal factor for a subset of HNSCC [3, 4].

The definition of these cancers is not unambiguous. For these types of tumors, it is best to use the criteria provided by Sherman, where the tumors are grouped on the basis of similarities in etiopathogenesis (most are tobacco related), related epidemiology, histological type, similar clinical stage, and on the basis of similarities in treatment (aggressive combination therapy) [5, 6]. Head and neck cancers are a group of malignant tumors, ep-

ithelial in nature, developing in upper areas of the respiratory and the digestive system. Most cancers from this group are advancing locoregionally and there is a relatively low risk of distant metastasis occurrence. Additionally, they are characterized by a high heterogeneity, meaning that their clinical course and susceptibility to treatment depends largely on their anatomical site [7].

Nowadays Head and neck cancer is subjects for multi-modality treatment approach which includes surgery, radiotherapy and chemotherapy [1]. The primary methods of treatment are surgery and radiotherapy, however in each case, the treatment is chosen on individual basis. The factors taken into consideration are: tumor staging, histological grading of the tumor, the general performing status of the patient and his consent to the proposed treatment [8]. Combination of these two methods is frequently used, and generally radiotherapy complements surgery, where the scale of the latter depends on the size of the tumor, its localization and the presence of metastases in cervical lymph nodes [7].

The presence of metastases in lymph nodes causes the surgery to be more extensive and to include lymphadenectomy. American Academy of Otolaryngology-Head and Neck Surgery has created a four-group classification of surgeries of the lymphatic system. Radical neck dissection is the removal of all cervical lymph node groups along with the surrounding tissues and anatomic structures found between the base of skull and the collarbone: spinal accessory nerve, internal jugular vein, and sternocleidomastoid muscle. Modified radical neck dissection is a surgery where all lymph nodes are removed, but with preservation of one or more nonlymphatic structures. Selective neck dissection removes some groups of lymph nodes with the preservation of spinal accessory nerve, internal jugular vein, and sternocleidomastoid muscle [9].

Neck dissection and the treatment using radiation are the main causes of head and neck lymphoedema. Chronic lymphoedema causes secondary musculoskeletal impairments, reduced motion in the affected area recurring infections requiring antibiotic therapy and frequent hospitalization; all this can lead to disability [10].

So far, there has been no unambiguous definition of lymphoedema which would achieve international consensus. The simplest way to define it is to say it is an excessive retention of protein-rich interstitial fluid in the intercellular space. Lymphoedema can be associated with many diseases, including heart diseases. It can also be caused by

complications stemming from cancer and cancer treatment [11].

The International Society of Lymphology recommends Complex Decongestive Therapy (CDT) as a basic treatment of lymphoedema, which includes manual lymphatic drainage (MLD), multi-layer compression, exercises improving the flow of the lymph and skin care [12]. The main purpose of the therapeutic intervention is to improve the quality of patient's life. It can be achieved not only by the reduction in the size of edema, but also by reducing the fibrosis of the tissues, improving the rate of motion in the relevant joints [13].

The advances in surgical techniques that are at our disposal, allow the patient to live longer, however, a massive, scar-causing surgery leads to many structural and functional changes, affecting every day functioning of the patients. Tissue adhesions and scars caused by the treatment impair functions such as: drinking, swallowing, chewing, facial expression, eye-sight and articulation of words [14].

Cancer diagnosis is in itself a very difficult situation for the patient. The localization in the head or the neck, long and complicated treatment only add to the stress, all this is worsened by the poor prognosis. [15]. Psychological tension causes reflexive resting tension in muscles, mainly in head, neck and upper torso area. The gravity and the character of the emotions affect patient's attitude. This leads to static and dynamic overloads in neck and shoulder muscles, which impairs rehabilitation and aggravates already existing symptoms described above [16].

## Aim

The aim of study is to evaluate the impact of manual lymphatic drainage on post-surgical lymphoedema in patients undergoing oncological treatment after the neck dissection.

## Material and methods

The study was conducted on a group of 20 patients, staying in the Head and Neck Surgery Department of the Greater Poland Cancer Centre in Poznań. The patients underwent primary tumor resection with neck dissection, and they developed a post-surgical lymphoedema. Their age ranged from 29 to 82 years of age.

Before the application of manual lymphatic drainage, medical history was taken from every pa-

tient, and on that basis it was possible to establish the course of the disease, the used method of surgery and its size, its kind, and when the lymphoedema occurred. Next, the patients were physically examined, head circumference was measured in centimeters – the distance between the angles of the mandible under the chin (in patients with edema in the mandibular area, the alternative was to measure the distance from temporomandibular joint) was measured to establish the initial size of the edema.

The basis of the therapy was manual lymphatic drainage (MLD) of the head, neck and face [17]. For each patient, an individual treatment strategy was created, which required the modification of basic techniques according to the extent of the surgery, with individually applied access to operated structures.

In this paper, we presented the order of grips in the standard manual lymphatic drainage of head and neck with the use of following techniques: hand circulation and „scoop” – kneading and pushing at the same time. We initiate the drainage by stroking the neck from the mastoid process of the temporal bone over sternocleidomastoid muscles to venous angles. Next, we start stimulation in a “transverse line” (Figure 1) – thumbs make stationary circles in

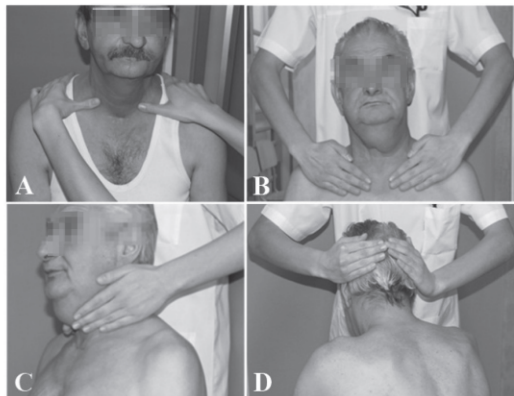


Figure 1. A) Transverse line, B) Terminus, C) Profundus, D) Pyramid.

the Terminus area, and the rest of the fingers move over trapezius muscle's descending part from lateral to medial parts. Next, deep lymph nodes of the neck – Profundus – are stimulated, stationary circles are performed in two lines, behind and in front of sternocleidomastoid muscle. Terminus is in the area of supraclavicular fossa, lymphatic vessels connect with the venous system in the venous angle, and that is where stationary circles are applied with a mild compression towards the sternum. Next, “pyramid” is performed – circular movements in several spots

at the back of the head. The external outline of the spots forms a pyramid with the peak on the bregma bone, and the base on the occipital bone. Drainage starts in the nuchal and continues until the bregma area. The movement of the lymph is towards the suboccipital and behind-the-ear lymph nodes.

Working on the lymph nodes (Figure 2) behind the ears involves “stationary circles”, the direction of the drainage towards the suboccipital nodes. Next in line are Profundus, Terminus, and transverse line. This is followed by transverse drainage of the back of the neck, in which the direction is from the nuchal line to the transverse waterline. Lower arm makes a circular movement, and upper hand, along with the thumb, uses a pumping grip. The “tree of life” – alternate drainage with the use of thumbs from transverse waterline (the level of spine of scapula) along cervical vertebra, towards Terminus, drainage with the use of thumbs from C7 spinous process towards the venous angle (left, right side).

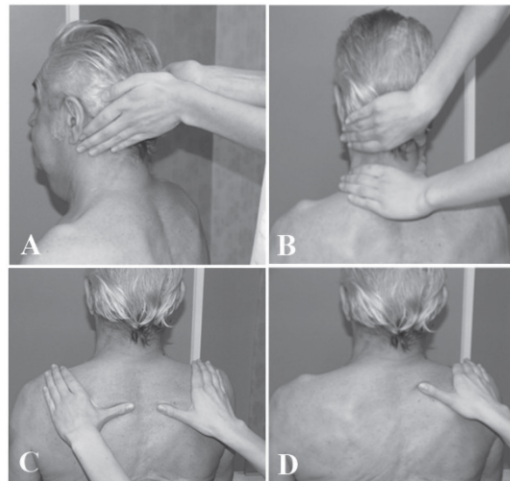


Figure 2. A) nodes behind the ears, B) transverse drainage of the neck, C), D) tree of life.

Covering deep paravertebral lymph nodes, everything ends with repeated stroking (Figure 3). The drainage of the face and neck uses only one technique – circulation of hands. Therapy starts with hands' stroking movements, from head's hairy part, through face, neck, towards venous angles. Next, submandibular lymph nodes are covered, using circular movements with the tips of the fingers, from the medial to lateral part. The body of the Mandible and the ramus of mandible are the next covered element, using circular movements in several bands, from the medial to lateral part, towards the parotid region. Nose drainage is based

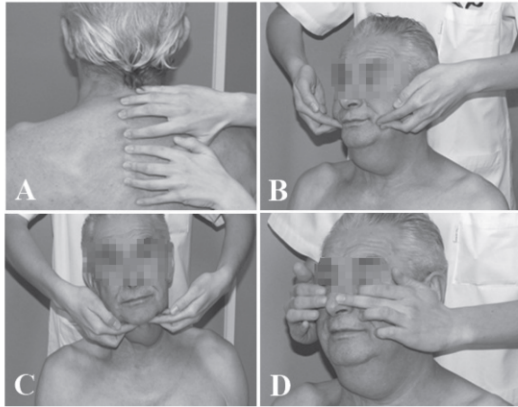


Figure 3. A) paravertebral lymph nodes, B) jaw area lymph nodes, C) submandibular lymph nodes, D) nose drainage technique.

on circulating with one finger simultaneously on both sides, from the nasal bridge towards the lacrimal canals, in several bands.

“Great journey” – drainage with circular movements is performed, in the following order: cheek, jaw, mandible, submandibular lymph nodes, Profundus and Terminus (Figure 4). Drainage of the eye area is performed with the tip of one finger on the right and the left side simultaneously, in the following spots: lacrimal canals, lower corner of the eye, eyelid; a specific thumb technique is used. The next step in the drainage of the face is the covering of the forehead, starting from the medial part, going to the lateral part, with circular movements lymph is drained towards the nodes near the ears.

Galea grip (Figure 5) – one of the grips used on the head – parietal bone, drainage is performed with

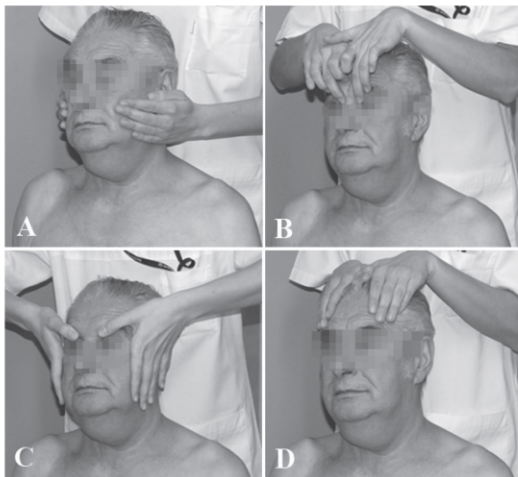


Figure 4. A) great journey, B, C) techniques used in the eye area, D) forehead grip.

whole hands, making standing circles in the direction of parotid lymph nodes. Temple is the next covered area, the standing circles performed with flat hands, keeping the direction of parotid lymph nodes. Covering the parotid lymph nodes, standing circles are performed with hands put parallel to pinna over temporomandibular joints. Manual lymphatic drainage is finalized with the covering of lymphatic system of the neck – Profundus, followed by the area of the venous angle – Terminus. The entire process ends with stroking movements on the face and the neck in the direction of supraclavicular fossa.

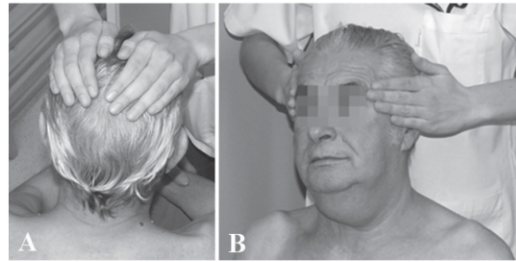


Figure 5. A) galea, B) temple grip.

## Results

The paper presents the therapeutic results of the use of manual lymphatic drainage in 20 patients. The purpose of the therapy was to restore maximum functional ability in patients.

Statistical analysis of changes in mean results in the group of patients with post-surgery lymphatic changes showed that the change is statistically significant,  $p < 0,002$  for the test T (Figure 6). The mean size for parameter A, accordant with the accepted methodology, before the therapy was 27,13, and after the therapy it was 25,75 cm.

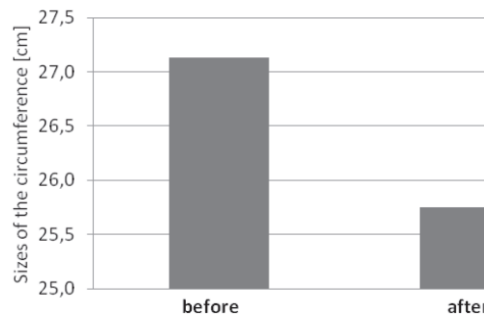


Figure 6. Mean sizes of the circumference after manual lymphatic drainage in patients who underwent neck dissection (n=20), suffering from post-surgery edema in the submandibular area. T-Test for dependent trials  $p < 0,05$ .

## Discussion

Currently, physiotherapy in head and neck cancer patients is rapidly developing. The presented study attempts to show the possibilities and results of therapy in patients after multi-modality treatment termination. The main goal of these techniques is the significant improvement of the quality of life. It can be achieved not only through the reduction in the size of edema, but also by reducing the fibrosis of the tissues, and by improving the rate of motion in the relevant joints [13]. Improvement in patient's functional state should be an important part of the treatment. According to the International Classification of Functioning model, proposed by the World Health Organization, structural deficits and any disabilities associated with them should always be analyzed. It is important to define the functional limitations caused by cancer, when starting the work with the patient. This message was also stressed by the international consensus on the treatment of lymphoedema in 2006 (Best practice for the management of lymphoedema), accredited by, among others, the American Society of Lymphology and the British Lymphology Society [18].

Neck dissection can result in the retention of lymph due to irreversible lymphatic system damage. Renkielska [19] points to radical resection of the lymph nodes as a cause of lymphoedema. Post-surgery congestive changes can be largely reduced with the use of manual lymphatic drainage, as confirmed in this study and the works of Białaś [17], Doś [10] and Dziura [20]. Proper examination of patient's bodily structures and functions can help in forming individual therapy goals. These goals can differ depending on the stage of the disease and on patient's general state. Manual lymphatic drainage has an impact on the working of the lymphatic system. Applying improper strength of the stimulus can result in no effect or in deterioration. Superficial tissues of the skin, subcutaneous tissue and fascia are all affected by the drainage. Scars in the area of edema serve as a barrier, reducing or entirely blocking the flow of the lymph [17].

## Conclusions

1. The application of manual lymphatic drainage in postoperative patients leads to reduction of lymphoedema in the neck and head area.

2. It is believed that the application of manual lymphatic drainage techniques prevents the development of chronic edema by the activation of lymphatic anastomosis.
3. Patient's education and postoperative anti-edema self-treatment reduce the risk of development of chronic lymphoedema.

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