The Laryngoscope

Effect of Complex Decongestive Therapy on Quality of Life and Physical Parameters in Head and Neck Lymphedema

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Objective: To assess the effect of complex decongestive therapy treatment (CDT) on quality of life, neck disability, cervical range of motion, and facial and neck lymphedema size using specific anatomical landmark points.

Methods: This prospective study was conducted in a tertiary cancer center in Turkey. Thirty patients included in the study were treated with CDT for 21 days. The patients were evaluated before and after CDT with MD Anderson Cancer Center Head and Neck Lymphedema (MDACC HNC) staging system, The Neck Disability Index, European Organization for Research and Treatment of Cancer Quality of Life 30 (EORTC-QLOC30), Facial Composite score and Neck Circumferences, cervical range of motion.

Results: Median follow-up was 7.2 months. After treatment of 30 patients significant cognitive function, emotional function, and social function ($p < 0.001$). After CDT treatment, the quality of life sub-parameters of EORTC QLQ-C30 showed significant improvement ($p < 0.001$). The facial composite score and neck circumferences indices showed significant improvement ($p < 0.001$). A decrease of 2% or more in the facial composite score and neck circumferences was observed in all patients participating in the study.

Conclusion: There have been few studies on the effectiveness of CDT on the EORTC QLQ-C30, facial composite score, and neck circumferences in head and neck lymphedema. In patients with head and neck lymphedema following head and neck cancer, our study demonstrated the positive effects of complex decongestive therapy (CDT) on neck disability, range of motion, quality of life, and facial and neck lymphedema tissue size.

Key Words: complex decongestive therapy, facial composite score, head and neck cancer, head and neck lymphedema, lymphedema, neck circumferences.

Level of Evidence: 4

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INTRODUCTION

Head and Neck Cancers (HNC) are the seventh most common cancer in the world. According to the 2020 GLOBOCAN cancer statistics data, 900,000 new diagnoses and 400,000 deaths occurred in HNCs all over the world.[1] HNC include areas of the oral cavity, larynx, tongue, lips, pharynx, salivary gland, nasal-paranasal sinuses, and nasopharynx. Although newly developed multidisciplinary treatment approaches aim to increase survival in patients with head and neck cancer, early and late complications of treatment (spinal accessory nerve palsy, cervical dystonia, muscle spasms, neuropathies, shoulder dysfunction, trismus, dysphagia, aspiration, malnutrition, lymphedema, fatigue, reduced or loss of taste, oral and dental gingival diseases, depression, anxiety, deterioration in body image, sleep disorders) adversely affect the quality of life of patients.[2] Studies have reported that individualized and need-focused interventions according to the symptoms of the patients can provide a partial and temporary improvement in the quality of life.[3]

Head and neck lymphedema (HNL) is a common complication of HNC treatment. Protein-rich fluid accumulation in the interstitial space after direct tumor infiltration, surgical excision of the tumor and surrounding tissues, and soft tissue damage due to direct radiation damage causes lymphedema[4,5] The incidence of HNL due to HNC treatments (surgery, chemotherapy, and chemoradiation) has been reported to be between 48% and 90%.[6] In a study by Deng et al. it was shown that 75% of patients with HNC had HNL ≥3 months after completion of treatment.[7] If left untreated, HNL can cause significant long-term cosmetic, functional, and psychosocial consequences that are irreversible.

Today, the gold standard treatment method in HNL is complex decongestive therapy (CDT). It is a multicomponent treatment method consisting of skin care, manual lymphatic drainage (MLD), compression therapy, and lymphedema exercises.[8]

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The literature contains limited studies regarding the effectiveness of CDT in the context of HNL. Moreover, there is a scarcity of research that assesses the impact of CDT on quality of life and neck disability in individuals with HNL. The primary objective of this study was to examine the treatment efficacy of CDT for HNL, utilizing specific anatomical landmarks, and to assess its influence on patients' quality of life and neck disability.

MATERIALS AND METHODS

Determination of Working Groups

Our study is a prospective study and 30 patients who had head and neck cancer in Ankara Abdurrahman Yurtaslan Oncology Training and Research Hospital Oncological Rehabilitation Clinic between March 2021 and December 2022 were evaluated.

The patients were included by meeting the following criteria: (1) ≥18 years old, (2) Completed head and neck cancer treatment (surgery/radiotherapy/chemotherapy) at least 3 months ago, (3) No history of recurrence and metastasis, (4) Patients who were able to read and understand the informed consent form were included in the study. Exclusion criteria were having metastases due to HNC or other primary cancers, 50% or more internal carotid artery stenosis, acute radiation dermatitis, acute renal failure, deep vein thrombosis, skin infections such as erysipelas-cellulitis, patients with recurrent SVO attacks.

Interventions

Complex decongestive therapy. CDT is a multicomponent treatment method consisting of skin care, MLD, compression therapy, and lymphedema exercises.[8] In our study, a skincare routine specific to lymphedema was applied to the patients.

The CDT program was conducted by a physiotherapist certified by the manual lymph drainage (MLD)/CDT training organized by Földischule/Germany. MLD. It was applied by physiotherapists specialized in lymphedema for 45 min, five days a week, for 21 days. It was applied by directing the lymphatic fluid from the cervical lymph nodes to the bilateral axillary lymph nodes and paying attention to the severity of the skin scar caused by radiotherapy. Patients were prescribed a ready-made HNL compression garment (FM Velcro Fastener, LIPOELASTIC) for compression after MDL Cervical, shoulder, temporomandibular joint isometric exercises, oral-motor exercises, tongue joint range of motion and strengthening exercises, and supraglottic swallowing maneuvers to reduce swallowing dysfunctions were applied to the patients for 21 days. These exercises were taught to the patient and given as home exercises. Self-MLD includes self-administered lymph drainage of the axillary, posterior, lateral, and anterior neck regions; pre- and retroauricular regions; lateral and anterior regions of the face and lower jaw.[9] It was recommended to perform Self-MLD once a day for 3 weeks and to perform the exercises daily for 10 repetitions each. Patients were regularly contacted by phone every week.

In addition to the therapeutic goals of MLD to increase lymph flow and lymph formation, the goal of treatment is to soften and reduce fibrosclerotic tissue. It should be taken into account that in stages II and III of lymphedema, the resistance to lymph flow is higher, the function of existing lymph vessels is inhibited due to tissue change, and the pre-lymphatic ducts are partially closed. Therefore, tongue range of motion, strengthening, and oral motor exercises have been recommended together with MLD.[10] Thus, we tried to prevent swallowing problems as well as lymphedema treatment.

Evaluation Methods

The questions in the form are prepared by the researchers by examining the literature; there were 8 questions to evaluate patients' age, gender, presence of comorbid disease, body mass index (kg/m^2), smoking/alcohol use, duration of lymphedema, type of surgery, and primary tumor localization.

MD Anderson Cancer Center Head and Neck Lymphedema Staging System. In our study, the MD Anderson Cancer Center Head and Neck Lymphedema (MDACC HNL) staging system was used to rate the severity of lymphedema.[11] Lymphedema staging was performed before and after CDT by the same internationally certified specialist according to The MDACC HNL scale. The MDACC HNL scale is based on patient complaints and lymphedema presentation. It was developed to evaluate findings not defined in the Földi scale.

- Stage 0; there is no visible edema, and the patient feels a feeling of heaviness.
- Stage 1a; there is soft, visible edema, no pitting,
- Stage 1b; there is soft reversible gingival edema,
- Stage 2; without tissue change, with firm irreversible edema
- In Stage 3, irreversible tissue changes such as hyperkeratosis and papillomatosis are observed.

Neck disability index. The Neck Disability Index (NDI) was used to assess disability due to HNL. This scale can be used for pain, personal care, sleep, driving, etc. It consists of 10 questions.

Each question ranges from 0 to 5 points, and an increased score is associated with increased disability. The result of this analysis can be evaluated in 4 categories; no disability (0–4), mild disability (5–14), moderate disability (15–24), severe disability (25–34), and total disability (35≤). The Neck Disability Index is an index that has proven validity (∞ 0.890–0.920) and reliability ($r = 0.890$) in patients with head and neck cancer and is used to follow up the recovery process after treatment,[12,13]

The European Organization for Research and Treatment of Cancer Quality of Life 30. A cancer-specific quality of life scale, The European Organization for Research and Treatment of Cancer Quality of Life 30 (EORTC QLQ-C30) was administered to the patients. EORTC QLQ-C30 is an applicable quality-of-life questionnaire with proven validity and reliability, which is the most widely used in cancer clinics worldwide.[14]

It contains five functioning scales (physical, social, role, cognitive, and emotional functioning), eight symptom scales (fatigue, nausea/vomiting, pain, dyspnea, sleep disturbances, appetite loss, constipation, and diarrhea), financial impact, and overall quality of life. All scale scores are linearly converted to range from 0 to 100. For the functioning scales and global QOL higher scores indicate better functioning; for the symptom scales higher scores indicate higher symptom burden. We used the validated Turkish version of this scale.[15]

Facial composite and neck circumferences. Metric measurements were made with a manual tape measure to evaluate the efficacy of the treatment in tissue size before and after CDT treatment. In each evaluation, the following rules were taken into consideration. Measuring sites were marked with the head in neutral and upright, and attention was paid to ensure that the head and trunk positions were the same in each evaluation. Measurements were made by the same physical medicine and rehabilitation specialist trained in lymphedema (Fig. 1).

Fig. 1. Facial composite(Left) and neck circumferences(Right) for evaluation of lymphedema. **FacialComposite; (**1) Tragus to mental protuberance (2) Tragus to mouth angle (3) Mandibular angle to nasal wing (4) Mandibular angle to internal eye corner (5) Mandibular angle to external eye corner (6) Mental protuberance to internal eye corner (7) Mandibular angle to mental protuberance. **Neck circumferences**; (1) Superior neck: immediately beneath mandible (2) Medial neck: midway between points 1 and 3 3. Inferior neck: lowest circumferential level.

The face and neck composite measurement evaluation method published by Smith and Lewin was used to standardize the measurement sites. The facial composite score is made from 7 different points. Measurements are made on both halves of the face and the obtained scores give the total facial composite score. A difference of 2% or more between baseline and follow-up scores is significant.

Cervical joint range of motion. The cervical range of motion was measured using a standard universal goniometer while sitting on a back-supported chair with the head in neutral. The average of 3 active cervical motion ranges performed by the patient after one passive movement was taken as the ROM value. Cervical extension, flexion, right–left lateral flexion, and right–left cervical rotation were measured.

Statistics

Descriptive statistics were expressed as mean ± standard deviation for normally distributed variables, median (min-max) for non-normally distributed variables, and the number of cases and (%) for nominal variables. The paired sample t-test was used for normally distributed, dependent, numerical data, the independent samples t-test was used to analyze independent data, and the Chi-square test was used for the difference between two categorical variables. Pearson correlation analysis was used for correlation analysis. Results were considered statistically significant for $p < 0.05$.

Ethics

Approval for this study was obtained from Ankara Dr. Abdurrahman Yurtaslan Training and Research Hospital on 09.06.2021 with Decision number: 2021–6/1200. Written informed consent was obtained from all participants and the study was planned and conducted by the concepts of the 1964 Declaration of Helsinki and its 2008 revision.

RESULTS

The mean age of the 30 patients included in the study was 56.6 ± 6.4 years (range 40–67) and 22 (73.3%) were male. There was no statistical difference in the mean age of males and females. ($p = 0.130$) The mean body mass index (BMI) of the patients was calculated as 19.3 ± 1.8 mg/m^2. All patients were active smokers and the proportion of patients with a smoking history of 40 packs/year was 43.7% (13). The rate of alcohol users was 46.7% (14). Comorbidity was present in 27 (90%) of the patients. The most common comorbidity was hypertension. All patients underwent surgery. All patients received chemoradiotherapy (CRT) after surgery. Demographic and clinical characteristics of patients included in the study are summarized in Table I.

Before CDT, 7 patients (23.3%) had stage 2 lymphedema and 23 patients (76.7%) had Stage 3 lymphedema. After treatment, all patients decreased to stage 1. Statistically significant regression of lymphedema stage was observed after CDT ($p < 0.001$). When NDIs before and after treatment were compared; 1 (3.3%) patient was mildly disabled, 8 (26.7%) patients were moderately disabled, 19 (63.3%) patients were severely disabled, and 2 (6.7%) patients were completely disabled before CDT. No limitation was observed in 6 patients (20%) after treatment. Twenty-two patients (73.3%) were mildly limited, and 1 patient (3.3%) was moderately and severely limited. When the pre-and post-treatment NDIs were compared, they were statistically significant. ($p < 0.001$) (Table II).

When the physical function, emotional function, role function, cognitive function, social function, and general health status parameters are evaluated with the EORTC QLQ-C30 scale, the mean scores before and after treatment are summarized in Table III. Each of the EORTC QLQ-C30 quality of life sub-parameters improved after CDT, and a statistically significant difference was found when their mean values were compared ($p < 0.001$).

When the cervical range of motion was evaluated after CDT, the improvement in all movements was evaluated as statistically significant ($p = 0.000$). The results are summarized in Table IV.

TABLE I.
Demographic and Clinical Characteristics of the Patients at Baseline ($N = 30$).

Mean age ± S.D. (range)—year	56.6 ± 6.4
Sex—no. (%)	
Male	22 (73.3)
Women	8 (26.7)
Mean BMI ± S.D.(range)—kg/m^2	19.3 ± 1.8
Smoking—no. (%)	30 (100)
Alcohol—no. (%)	14 (46.7)
Comorbidity—no. (%)	27 (90)
Hypertension	14 (46.7)
DM	13 (43.3)
Primary tumor localization—no. (%)	
Oral Cavity	6 (20)
Oropharynx	4 (13.3)
Larynx	20 (67.7)
Type of Dissection—no. (%)	
Unilateral Head and Neck Dissection	3 (10)
Bilateral Head and Neck Dissection	27 (90)
Duration after the last medical treatment (months)—no. (%)	
0–18	16 (53.3)
18–36	12 (40)
36>	2 (6.7)
Duration of lymphedema (months)—no. (%)	
0–18	15 (50)
18–36	12 (40)
36>	3 (10)
Lymphedema stage—no. (%)	
Stage 1	-
Stage 2	7 (23.3)
Stage 3	23 (76.7)

BMI = Body mass index; S.D. = Standard deviation; DM = Diabetes mellitus; NDI = Neck disability index.

TABLE II.
Comparison of Lymphedema Stages and NDI Before and After CDT

	Baseline	After CDT	*p* values*
Lymphedema stage—no. (%)			
Stage 1	-	30 (100)	<0.001
Stage 2	7 (23.3)	-	
Stage 3	23 (76.7)	-	
NDI—no. (%)			
No disability	-	6 (20)	<0.001
Mildly disability	1 (3.3)	22 (73.3)	
Moderate disability	8 (26.7)	1 (3.3)	
Severe disability	19 (63.3)	1 (3.3)	
Complete disability	2 (6.7)	-	

*Paired sample *t*-test, CDT = Complex decongestive therapy; NDI = Neck disability index.

When the face composite score and neck composite score indices were evaluated after CDT, the mean difference in the facial composite score was calculated as 5.5 ± 3.4, while the mean difference in neck composite score was 5.4 ± 2.4. As the decrease in neck composite score increased, the increase in joint range of motion in neck flexion was significant. ($p = 0.047$). The difference in the face and neck composite score of all patients participating in the study was 2% and above.

TABLE III.
Comparison of EORTC QLQ-C30 Quality of Life Scores Before and After CDT.

EORTC QLQ-C30 Mean ± S.D.	Before CDT	After CDT	*p* values*
Physical Function	45.4 ± 29.4	86.4 ± 10.8	<0.001
Role Function	40.7 ± 27.3	87.7 ± 13.9	
Cognitive Function	52.1 ± 26.0	95.1 ± 9.8	
Emotional Function	44.4 ± 27.7	89.3 ± 14.3	
Social Function	43.2 ± 28.1	84.5 ± 19.8	
General Health Status	40.2 ± 16.2	82.2 ± 13.8	

*Paired sample *t*-test, CDT = Complex decongestive therapy; EORTC QLQ-C30 = The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire 30; S.D. = Standard deviation.

TABLE IV.
Comparison of Cervical Range of Motion Before and After CDT.

Cervical Joint Range of Motion Mean ± S.D.	Before CDT	After CDT	*p* Values*
Flexion	16.5 ± 6.1	29.8 ± 4.4	<0.001
Extension	11.9 ± 5.9	21.6 ± 5.9	
Right lateral flexion	8.4 ± 4.8	19.0 ± 6.0	
Left lateral flexion	9.1 ± 4.7	19.0 ± 6.4	
Right lateral rotation	10.8 ± 9.4	20.9 ± 9.4	
Left lateral rotation	11.0 ± 8.3	21.3 ± 7.6	

*Paired sample *t*-test, CDT = Complex decongestive therapy; S.D. = Standard deviation.

DISCUSSION

This study showed that CDT resulted in a significant improvement in neck disability scores and a significant increase in quality of life in patients with HNL. HNL is a common complication in patients recovering from HNC and affects patients' quality of life. Therefore, treatment options that will reduce the symptom burden and improve the quality of life of patients with HNL are becoming increasingly important.

The number of studies examining the treatment methods and results of treatment related to HNL is few in the literature. Piso et al. applied MLD and compression therapy for 12 weeks in patients with head and neck cancer. In the study, the response of the patients to CDT after 6 weeks of treatment was found to be statistically significant ($p < 0.05$).[16] Jeff et al. recommend an individualized treatment program consisting of skin care, MLD, compression bandages, lymphedema exercises, and neck pads.[17] Smith et al. applied CDT consisting of skin care, MLD, exercise, and compression in sessions with a physiotherapist for 4 weeks or as a home program applied by the patient at home for 3 months. Regardless of the stage of cancer and the type of primary tumor, 60% of the

Fig. 2. Progressive reduction in head and neck lymphedema after complex decongestive therapy (Left: Before CDT, Right: After CDT).

patients responded to CDT treatment and it was found to be statistically significant ($p < 0.001$).[11]

Although there are many studies to evaluate HNL, there is a need for standardized measurement methods and many more studies on how to evaluate the effectiveness of treatment. In a systematic review, it was reported that clinical assessment of patients should also be given importance to classify symptoms and monitor improvement in treatment.[18]

In a study, at least one level of lymphedema stage was decreased in 80% of the participants after CDT in HNL.[19] Similarly, another prospectively conducted controlled and randomized study showed that HNL patients had improvements after CDT.[20] In our study, it was observed that the stage of lymphedema was significantly regressed after CDT, in line with the literature. ($p < 0.001$). In HNL, a difference of 2% or more between baseline and follow-up composite scores is considered significant.[21] In our study, a significant decrease was found in the mean facial composite score ($5.52 \pm 3.44\%$) and neck composite score (5.42 ± 2.17) of the patients after CDT.

Doke et al., lymphatic decongestion and skilled fibrotic techniques were applied to 34 patients who received high-dose radiation therapy, and the results of the patients were analyzed retrospectively. According to the results of the study, lymphedema therapy is associated with objective improvements in range of motion, neck circumference, and pain scores in the majority of patients.[22] A recent systemic review showed that standard lymphedema therapy with kinesio taping and advanced pneumatic compression devices, appear to be safe and beneficial.[23] In our study, when the mean values of NDI scores after CDT were compared, it was concluded that there was a statistically significant improvement. ($p < 0.001$).

According to the available literature, there are very few studies on the effectiveness of CDT on EORTC QLQ-C30 quality of life in HNL. In our study, improvement was observed in each of the EORTC QLQ-C30 quality of life sub-parameters and their mean values were found to be statistically significant when compared ($p = 0.000$). In a study, the results of the patients at Week 6 and Week 22 during HNL treatment were evaluated. According to the qualitative data and scale results obtained from the patients, it was reported that there was no significant difference in quality of life, fear of poor progression of the cancer process, and body image perceptions, but there was a significant decrease in distress scores. It has been concluded that HNL also negatively affects psychosocial functions in patients and they need support, and their social participation increases with the decrease in lymphedema severity.[24]

In our study, although half of the patients had been in the disease process for more than 18 months, there was a significant increase in the mean scores of the emotional function sub-dimension of the EORTC-QLQ scale after treatment. The results of Tschiesner et al. also support our study.[25] While HNC patients who had been treated for a long time thought that coping with sadness and anxiety was important and affected their quality of life, it was reported that patients who had been treated for less than 12 months did not attach importance to their mood. In addition, in this study, in which the priorities of the patients were determined, it was determined that the patients wanted to continue their activities of daily living, to have open communication with their doctors and nurses, to get rid of cancer, and to have their treatment costs covered by their health insurance. It is thought that taking into account the emotional well-being of the patients as well as maintaining their daily life activities is important in improving the quality of life.

In a retrospective study, 65.4% of the patients who underwent selective neck dissection(SND) showed limitation of cervical ROM after at least 6 months. Affecting rates of cervical rotation (84%) and lateral flexion (79%) in patients undergoing SND were found to be similar regardless of the surgical side (unilateral or bilateral).[26] According to the available literature, this study is the first to evaluate the cervical ROM in HNL after CDT. In each patient who participated in our study, a significant increase in cervical ROM was detected in all directions after CDT. (Fig. 2).

CONCLUSION

For patients who develop HNL after HNC treatment especially post-radiotherapy, CDT including skin care, manual lymphatic drainage, lymphedema exercises, cervical and upper extremity exercises, tongue and jaw strengthening exercises, supraglottic swallowing maneuvers, diaphragmatic breathing exercises, compression garments for 21 days; We have demonstrated in our study that neck disability, cervical ROM, quality of life, and facial and neck lymphedema size have a positive effect on the results.

There have been few previous studies on the effectiveness of CDT on EORTC QLQ-C30 quality of life in HNL. In addition, our study is important because it is the first study in which cervical ROM was evaluated with CDT. Our study showed that neck disability, cervical ROM, quality of life, and facial and neck lymphedema size (tissue size) positively affected the results.

We think that this study, which we have done in terms of difficulties in early diagnosis and treatment guidelines due to the lack of treatment experience in HNL and the diversity of clinical presentations, will guide physicians in HNL. As a result of the research, it is recommended to plan future evidence-based studies in a larger population, randomized controlled studies, and long-term patient outcomes.

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