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Effect of a Manual Lymphatic Drainage with Rehabilitation Exercise on Edema, Pain, And Lower Extremity Function in Gynecological Cancer After Surgery

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Abstract

This study aimed to determine the effects of manual lymphatic drainage with rehabilitation exercises on edema, pain, and lower extremity function in patients with gynecological cancer after surgery. The study included 20 patients with gynecological cancer with a Numeric Rating Scale (NRS) pain score >3, who were either inpatients or outpatients in Seoul. The patients were randomly assigned to either the experimental group (n=10) or control group (n=10). The experimental group underwent manual lymphatic drainage with rehabilitation exercises, whereas the control group underwent manual lymphatic drainage with diaphragmatic breathing. Each patient was treated for 50 min twice a week for 4 weeks. Before and after the experiment, edema, pain, lower extremity function, and quality of life were evaluated using the Circumference Tape, Numeric Rating Scale, Lower Extremity Functional Scale, and Memorial Symptom Assessment Scale. The results of this study were as follows. First, the edema between the experimental and control groups significantly decreased before and after the intervention; however, there was no significant difference in the comparison between the groups. Second, the pain scores between the experimental and control groups significantly decreased before and after the intervention, and there was a significant difference in the comparison between the groups. Third, the lower extremity function between the experimental and control groups significantly increased before and after the intervention, and there was no significant difference between the groups. Forth, the quality of life between the experimental and control groups significantly increased before and after the intervention, and there was significant difference in the comparison between the group. The physical symptoms were significantly different between the groups; however, the emotional symptoms were not. The analysis of this experiment showed that, both the groups were effective in improving edema, pain, lower extremity function, and quality of life in patients with gynecological cancer undergoing surgery. In particular, manual lymphatic drainage with rehabilitation exercises was more effective than manual lymphatic drainage with diaphragmatic breathing for edema and physical symptoms of patients with gynecological cancer after surgery.

Keywords: *Manual Lymphatic Drainage, Gynecological Cancer, Edema, Pain, Lower Extremity Function*

INTRODUCTION

Gynecological cancer refers to any cancer that occurs in the female genital organs below the stomach and within the pelvis between the hip joints. The incidences of gynecological cancers in Korea were reported to be 6.4, 6.4, and 5.6 cases of cervical, endometrial, and ovarian cancers, respectively, per 100,000 population. In addition, the 5-year survival rate of gynecological cancer increased by approximately 5% in 2015-2019 compared to 1993-1995 [1]. The survival rate of gynecological cancer is increasing annually with advanced surgical methods and various treatments; however, changes in the gastrointestinal tract, bladder, hormones, sexual function, and fertility are common [2]. In addition, the quality of life of patients with gynecological cancer can be affected by various symptoms after treatment [3]. Gynecological cancer survivors experience physical problems such as fatigue, limb numbnes, menopause, sexual dysfunction, and lymphedema because of chemotherapy and radiation treatment after surgery [4]. Therefore, gynecological cancer survivors require continuous observation even after cancer treatment, and complications should be prevented through patient education and early treatment [5]. Lymph node dissection around the pelvis and aorta is a standard procedure for gynecological cancer surgery and one of the essential surgeries for staging [6]; however, as a result of this patients experience lower extremity lymphedema [7]. Lower extremity lymphedema is caused by damage to the lymphatic system, accumulation of tissue fluid in the interstitial tissue, and failure of the lymphatic fluid to become absorbed into the lymphatic vessels [8]. Therapies for cancer, such as pelvic and para-aortic lymphadenectomy and radiation

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therapy have been implicated in impaired lymphatic circulation and increased volume of lower extremity lymphedema [9].

Lower extremity lymphedema is a chronic, progressive, and often disabling disease that is common in patients with gynecological cancers [10]. The incidence of lymphedema depends on the degree of surgery, number of lymph node dissections, radiation treatment, and obesity. About 20-30% of patients with gynecological cancer experience lower limb lymphedema [11]. The prevalence of lower extremity lymphedema is 20-27.2% when radiation therapy and chemotherapy are performed after gynecological cancer surgery accompanied by lymphadenectomy [10]. This builds up and increases the osmotic pressure on the tissue, forming edema and increasing the water pressure in the tissue [12]. Among patients with lower extremity lymphedema, 70.4% have difficulty walking or standing and, have restricted social activities [13]. If the lymphedema and fibrosis of the affected side progress, not only the functional defects but also the appearance cause anxiety, anxiety, depression, and mental distress [14]. In addition, some patients experience difficulties with daily life functions, such as pain, tingling sensations, swelling of the lower extremities, and difficulty walking, even without developing lower extremity lymphedema [13].

A manual lymphatic drainage relieves the fibrotic tissues containing excessive protein and increases the lymphatic drainage through the veins. It stimulates the contraction of normal lymphatic vessels located in the shallow fascia and promotes smooth lymphatic flow bypassing and moving closer to the lymphatic circulation. The most recognized and widely used aqueductal lymphatic drainage methods are the Vodder, Fördi, Casley-Smith, and Leduc techniques [15]. A manual lymphatic drainage improves the blood circulation, stimulates the movement of lymph and other tissue fluids, and positively affects the removal of unnecessary tissue fluids and tissue softening [16].

When rehabilitation exercise is applied to patients with gynecological cancer with lymphatic circulation disorders after lymphadenectomy, the proper movement of the muscles and joints stimulates the lymphatic vessels. In Casley's study, it was reported that changing the tissue pressure can promote lymphatic circulation [17], and the most effective method is to promote lymphatic circulation through exercise by moving the skeletal muscles [18]. In Sagen's study, it was reported that physical movement after breast cancer surgery promotes lymphatic drainage by causing intermittent pressure changes between the muscles and external pressure [19].

Diaphragmatic breathing, a slow, deep breathing technique [20], can relieve symptoms by moving the diaphragm to create a pressure differential in the abdomen, allowing the lymph to drain properly to the center and flow into the thoracic lymphatics [21].

This study compared the experimental group that performed the manual lymph drainage method including rehabilitation exercise after surgery for patients with gynecological cancer who underwent pelvic and para-aortic lymph node dissection, with the control group that performed the manual lymph drainage method including diaphragmatic breathing, to determine the treatment effect. This study aimed to investigate the effects of gynecological cancer surgery on edema, pain, and lower extremity function.

MATERIALS AND METHODS

Study Design and Sample

This study included patients diagnosed with gynecological cancer who underwent lymph node dissection surgery and were hospitalized or visited a cancer center in Seoul, Korea. The patients who had a pain score of 3 or higher were randomly selected. Patients with diseases such as renal failure, deep vein thrombosis, varicose veins, congestive heart failure, pulmonary hypertension, and congenital lymphatic obstruction, or those diagnosed with and treated for lymphedema before gynecological cancer diagnosis and treatment were excluded. As shown in Fig. 1, the alignment is a flow chart of the study.

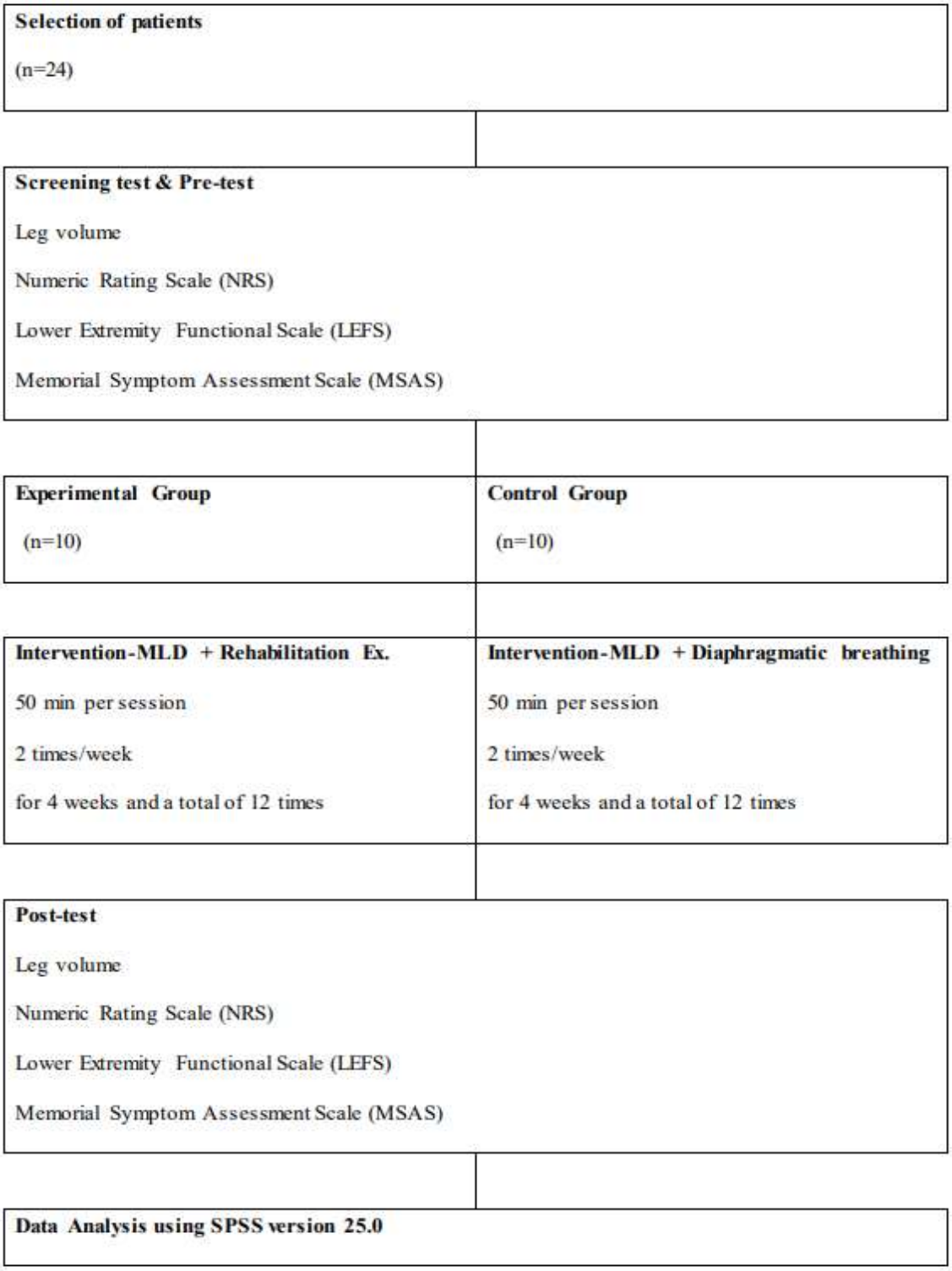

Fig 1. Flow chart

This was an experimental study comparing the results before and after an intervention. Among the patients who underwent gynecological cancer surgery accompanied by pelvic and aortic lymphadenectomies, 24 patients who met the selection and exclusion criteria were randomly assigned to experimental and control groups, with 12 patients in each group. The names were selected; four patients quit halfway owing to poor physical condition, and finally 20 patients completed the study.

Before treatment, edema, pain level, lower extremity function, and quality of life were evaluated. Edema was measured using a measuring tape, pain was evaluated using the Numeric Rating Scale (NRS), the Lower Extremity Functional Scale (LEFS) was used to evaluate the lower extremity function, and the Memorial Symptom Assessment Scale(MSAS) was used to evaluate the quality of life. The experimental and control groups were treated twice a week for 4 weeks for 50 min. After eight treatments, post-measurement was performed with the same measurement tool as the pre-measurement, and the measurement values were analyzed. The general characteristics of the patients were presented in Table 1.

Table 1. General characteristics of the patients

Categories	Experimental group	Control group	*P*
Age (y)	48.40±13.24	51.70±10.41	.543
Height (cm)	159.10±5.17	159.50±4.81	.860
Weight (kg)	59.40±8.22	59.70±6.05	.927
Body Mass Index (kg/m²)	23.39.58±2.32	23.41±1.30	.981
Type of Cancer			
Cervical	4(40)	3(30)	
Endometrial	3(30)	3(30)	
Ovarian	3(30)	4(40)	
Disease stage			
I	3(30)	4(40)	
II	1(10)	1(10)	
III	3(30)	2(20)	
IV	3(30)	3(30)	
Treatment Modalities			
Surgery	1(10)	0(0)	
Surgery, chemotherapy	0(0)	2(20)	
Surgery, radiotherapy	2(20)	2(20)	
Surgery, chemotherapy, radiotherapy	7(70)	6(60)	
Family history			
Yes	2(20)	4(40)	
No	8(80)	6(60)	

an(%), values for all variables, except for the 'a' variable, are presented as mean ± standard deviation

Measures

Leg Volume

The patient was lying flat, and the thigh circumferences were measured 20 and 10 cm above the knee close to the groin; calf and ankle circumferences were measured 10 cm below the knee just above the ankle bone. The measurement site was

determined using a dot with a pen. The volume measurement using the measure tape, which is an evaluation tool, showed a high reliability with ICC=0.97-0.99 [22].

Pain

Changes in pain were measured using the NRS to determine the effects of manual lymphatic drainage, including rehabilitation exercises, on pain after gynecological cancer surgery. The NRS is a pain evaluation scale used by patients who can communicate and understand the concept of numbers. A score of 0 indicates no pain at all, and 10 indicates unbearable pain, such as death. Pain can be objectively evaluated by dividing it into mild (1-4 points), moderate (5-6 points), and severe (7-10 points). The NRS is an effective evaluation tool that shows high discrimination and reproducibility during pain evaluation in patients with cancer [23].

Leg Function

Changes in the lower extremity musculoskeletal function were measured using the LEFS to determine the effect of manual lymphatic drainage, including rehabilitation exercises after gynecological cancer surgery, on the patient's lower extremity function. This evaluation tool consisted of a questionnaire with 20 items on daily life activities affected by musculoskeletal disorders of the lower limbs, such as housework, hobbies, getting in and out of the bathtub, walking from one room to another, putting on shoes or socks, squatting, lifting objects, doing easy or difficult housework, getting in and out of a car, walking, going up and down stairs, sitting on the floor for 1 h, standing for 1 h, making sharp turns, jumping, and turning in bed. Each item selected the degree of difficulty when the patient moved using the lower extremities, and was scored from 0 to 4, with 0 representing the most difficult condition. The maximum score for 20 questions was 80, and the higher the score, the better was the function [24]. The LEFS showed a high reliability with ICC=0.98, and Cronbach's alpha 0.96 [25].

Quality of Life

The MSAS evaluates the symptoms that may occur in patients with gynecological cancer, such as physical and psychological difficulties related to their quality of life after surgery [26]. The evaluation items included common physical symptoms such as anorexia, drowsiness, constipation, nausea, vomiting, and dizziness, and common psychological symptoms such as anxiety, sadness, tension, and irritability. The higher the score, the more frequent and greater was the difficulty level. In Nho's study, it used a tool adapted in Korean, and Cronbach's alpha of the Korean version of the MSAS in a previous study showed a reliability of 0.80-0.91 [27].

Interventions

Manual Lymphatic Drainage

A physical therapist with 13 years of clinical experience certified by Dr. Vodder School conducted eight treatments twice a week for 4 weeks.

The treatment was performed by moving the lymph fluid in the normal lymphatic direction via light skin stretching using a scoop, pump, and rotary technique. As the patients underwent pelvic and aortic lymph node dissection, the flow of lymph into the pelvic, aortic, and inguinal lymph nodes was bypassed to the axillary lymph nodes.

Rehabilitation Exercise For Gynecological Cancer After Surgery

Rehabilitation exercises after gynecological cancer surgery were reconstructed into hip joint stretching, leg muscle strengthening exercises, and core exercises so that the 30-min exercise in Do's previous study could be performed for 10 min [28]. Strength training was performed with two sets of 10 repetitions at moderate intensity by referring to the exercise guidelines for cancer patients provided by the American Society of Sports Medicine. After completing the exercise, they were recommended to lie down and rest comfortably with the legs elevated for > 10 min.

Diaphragmatic Breathing

Under the guidance of a therapist, the participants were instructed to perform slow, deep diaphragmatic breathing [29]. In the supine position, one hand was placed on the chest and the other on the stomach, inhaling and exhaling through the nose for 6. The patients were instructed to move their chest minimally and move their diaphragm while breathing [29].

Data Analysis

The data obtained in this study were analyzed using SPSS 25.0 software, and the statistical significance level was set at 0.05. As the number of patients was less than 20, the Shapiro-Wilk normality test was performed, and the normality was satisfied. For general characteristics of the participants, mean and standard deviation, frequency, and percentage were used, and Fisher's exact test was used to examine the homogeneity. Before and after the experiment, the changes in leg circumference, pain, lower extremity function, and quality of life of the patients in the two groups were analyzed using the mean, standard deviation, and paired t-test, and the two groups were analyzed according to the intervention method. To determine the differences between the groups, the mean and standard deviation of the result before and after the intervention between the two groups were subtracted, and an independent t-test was used.

RESULTS

Comparison of the Edema Between Both the Groups After Intervention

There were no statistically significant differences in the thigh 20 cm, thigh 10 cm, calf 10 cm, and ankle circumferences between the two groups before the intervention ($p>0.05$). In the before and after comparison between the two groups after 4 weeks of intervention, there was a statistically significant difference in the leg circumference ($p<0.05$). There was no statistically significant difference in the leg circumference between the two groups according to the intervention ($p>0.05$). The differences between the groups are shown in Table 2.

Table 2. Comparison of edema between the two groups

Leg volume		Experimental group(n=10)	Control group(n=10)	*T or Z*	*P*
Thigh 20cm	Pre	54.80±10.86	49.85±4.32	1.339	.206
	Post	52.20±9.54	47.75±4.12	.729	.477
	t	4.437	5.900		
	p	.002*	.000*		
Thigh 10cm	Pre	44.65±8.84	42.00±4.52	.843	.414
	Post	41.75±7.72	39.35±4.54	.352	.731
	t	4.411	9.842		
	p	.002*	.000*		
Calf 10cm	Pre	37.25±6.70	34.40±2.97	1.229	.242
	Post	34.60±4.95	32.25±3.41	.623	.543
	t	3.811	5.352		
	p	.004*	.000*		
Ankle	Pre	22.95±2.10	21.70±1.82	1.419	.173
	Post	21.55±1.64	20.65±1.52	.714	.486
	t	3.384	3.992		
	p	.008*	.003*		

Values for all variables are presented as mean ± standard deviation

Comparison Of Pain Between Both the Groups After Intervention

There was no statistically significant difference in the pre-assessment NRS scores between the two groups before the intervention ($p>0.05$). In the before and after comparison between the two groups after 4 weeks of intervention, the score on the NRS showed a statistically significant difference ($p<0.05$). The difference between the scores on the NRS according to the intervention between the two groups was statistically significant ($p<0.05$). The differences between the groups are shown in Table 3.

Table 3. Comparison of pain between the two groups

NRS		Experimental group(n=10)	Control group(n=10)	*T or Z*	*P*
	Pre	5.40±0.96	5.00±1.15	.501	.623
	Post	3.10±0.87	3.80±0.78	3.051	.008*
	t	7.667	6.000		
	p	.000*	.000*		

Values for all variables are presented as mean ± standard deviation

NRS: Numeric Rating Scale

Comparison Of Leg Function Between Both the Groups After Intervention

There was no statistically significant difference in the pre-test LEFS between the two groups ($p>0.05$). In the before and after comparison between the two groups after 4 weeks of intervention, the LEFS scores showed a statistically significant difference ($p<0.05$). There was no statistically significant difference in the LEFS scores between the two groups according to the intervention ($p>0.05$). The differences between the groups are shown in Table 4.

Table 4. Comparison of lower extremity function between the two group

LEFS		Experimental group(n=10)	Control group(n=10)	*T or Z*	*P*
	Pre	9.30±1.88	8.80±2.52	.806	.431
	Post	22.90±3.90	21.30±3.74	.949	.360
	t	-13.141	-23.958		
	p	.000*	.000*		

Values for all variables are presented as mean ± standard deviation

LEFS: Lower Extremity Functional Scale

Comparison Of Quality of Life Between Both the Groups After Intervention

In the pre-assessment between the two groups before the intervention, there was no statistically significant difference in physical, psychological, and total symptom scores on the MSAS ($p>0.05$). In the before and after comparison between the two groups after 4 weeks of intervention, there were statistically significant differences in the physical, psychological, and total symptom scores on the MSAS ($p<0.05$). Regarding the difference in scores on the MSAS according to the intervention between the two groups, there was a statistically significant difference in the physical symptom score and total score ($p<0.05$); however, there was no statistically significant difference in the psychological symptom score ($p>0.05$). The differences between the groups are shown in Table 5.

Table 5. Comparison of the quality of life between the two groups

MSAS		Experimental group(n=10)	Control group(n=10)	*T or Z*	*P*
Physical	Pre	88.10±9.50	86.30±10.25	.519	.616
	Post	66.70±4.44	71.40±7.39	2.091	.045*
	t	7.876	9.875		
	p	.000*	.000*		
	Pre	15.40±1.07	14.50±1.50	1.406	.193
	Post	6.90±3.10	5.10±1.28	-.896	.384

Psychological	*t*	10.200	16.734		
	p	.000*	.000*		
Total	Pre	104.50±8.73	100.80±11.59	.938	.373
	Post	73.60±6.51	76.30±7.97	2.264	.037*
	t	13.898	14.029		
	p	.000*	.000*		

Values for all variables are presented as mean ± standard deviation

MSAS: Memorial Symptom Assessment Scale

DISCUSSION

This study applied the manual lymph drainage method including diaphragmatic breathing to investigate the effects of the manual lymph drainage method including rehabilitation exercise on edema, pain and lower extremity function after gynecological cancer surgery accompanied by pelvic and aortic lymphadenectomy. The pre and post exercise within and between the groups were compared.

There was a significant difference between the two groups in the comparison before and after the experiment between the experimental group that performed the lymphatic drainage method including rehabilitation exercise after gynecological cancer surgery and the control group that performed the lymphatic drainage method including diaphragmatic breathing. This comparison revealed significant differences in the pain and physical symptoms.

As a result of measuring edema in the experimental and control groups, there was a significant difference in both the groups before and after the experiment; however, no significant difference was found between the groups. Sitzia et al. (2002) reported that manual lymphatic drainage was effective in reducing lymphedema [30]. Boris et al. (1997) reported that manual lymphatic drainage was effective for edema by relaxing the muscles and strengthening the function of lymphatic vessels to remove the lymphatic fluid accumulated in the tissues [31]. In a study by Singh et al. (2016), patients with gynecological cancer with lymphedema reported that gradual and regular exercise helped relieve the swelling and symptoms [32]. In a study by Cho et al. (2016), when exercise therapy and manual lymphatic drainage were applied to patients with axillary membrane syndrome after breast cancer surgery for 4 weeks, the pain and volume of the upper extremities were significantly lower than those of exercise therapy and general physical therapy interventions [33]. These results suggest that the manual lymphatic drainage absorbs wastes from tissues into the lymphatic vessels, applies rehabilitation exercises to change tissue pressure by moving muscles and joints, and stimulates the movement of lymphatic vessels to promote lymphatic circulation, thus helping reduce the leg volume. In addition, a previous study by Jack (1992) reported that the diaphragmatic breathing caused the lymph fluid to flow into the blood vessels while the lungs compressed the thoracic lymphatic vessels [34]. In a previous study by Fördi (2007), during diaphragmatic breathing, the lymphatic fluid moving towards the venous angle during inhalation prevented the lymph fluid from returning from the legs owing to the downward movement of the diaphragm. During exhalation, the chyme was empty and allowed the lymph fluid to flow into the thoracic lymphatic duct [35]. These previous studies, consistent with the results of this study, confirmed that both the manual lymph drainage, including rehabilitation exercise and diaphragmatic breathing, can help reduce edema in patients who have undergone gynecological cancer surgery.

As a result of measuring pain in the experimental and control groups, both the groups showed a significant difference in the comparison before and after the experiment. In the comparison between the groups, the experimental group that performed the lymphatic drainage method including rehabilitation exercise, showed a statistically significant difference compared to the control group. Ko (2021) reported that pain was reduced when aqueductal lymph drainage was applied to patients with breast cancer patients thrice a week for 4 weeks after surgery [36]. The gentle mechanical stimulation applied in the manual lymphatic drainage method is transmitted to the nociceptors located in the skin, activating the cultured cells, and reducing the pain using the gate control theory. In addition, repetitive and rhythmic stimulation raises the parasympathetic nerve and lowers

the sympathetic nerve, which relaxes the sympathetic nerve that controls the muscles of the lymphatic vessels, thereby expanding the space within the lymphatic vessels and increasing the inflow of lymphatic fluid, which effectively reduces pain-causing substances and inflammatory mediators [15]. In this study, manual lymphatic drainage, including rehabilitation exercises after gynecological cancer surgery, was more effective in reducing pain than manual lymphatic drainage including diaphragmatic breathing. In a previous study by Irwin et al. (2015), breast cancer survivors taking aromatase inhibitors reported a reduction in joint pain when they performed progressive resistance exercise for 150 min/ week for 12 months [37]. A previous study by McNeely et al. (2008) reported that shoulder pain was reduced when upper extremity exercises were applied to patients with head and neck cancer for 12 weeks [38]. The results of these previous studies are consistent with those of the present study.

As a result of measuring the function of the lower limbs in the experimental and control groups, there was a significant difference between the two groups before and after the intervention, and no significant difference was found in the comparison between the two groups.

Baumann et al. (2018) reported that exercise positively affected lymphedema after breast cancer surgery [39]. In addition, in a study by Jeong Seong-gwan et al. (2016), when the manual lymphatic drainage was applied for 8 weeks to patients with secondary lower extremity lymphedema after gynecological cancer, the functions of lower limbs such as walking and climbing stairs showed increased functional scores on the Patient Specific Functional Scale (PSFS) [40]. The results of these previous studies are consistent with those of the present study.

Finally, as a result of measuring the quality of life of the experimental and control groups, both groups showed a significant difference before and after the experiment; however, in the comparison between the groups, there was a significant difference in physical symptoms and no significant difference in psychological symptoms. In a study by Kim et al. (2008), when complex lymphedema physical therapy, including manual lymphatic drainage was applied to one lower extremity of a patient with gynecological cancer with lymphedema, they reported that the physical, mental, and social functions and quality of life improved [41]. Molski et al. (2013) reported that when aqueductal drainage was applied to patients with chronic venous disease, the symptoms decreased and quality of life improved [42]. In a study by Kendrova et al. (2020), when complex lymphedema physical therapy, including manual lymphatic drainage, was applied to patients with gynecological cancer after surgery, physical and psychological symptoms and functions improved, and edema decreased, thus improving the quality of life [43]. The results of these previous studies are consistent with those of the present study. In a study by Mehnert and Koch (2008), patients with gynecological cancer reported increased nervousness and depression after 10 weeks of exercise [44]. Samuel et al. (2019) reported that the quality of life improved when rehabilitation exercises were applied to patients with head and neck cancer who had undergone chemotherapy and radiotherapy [45]. In addition, a study by Hopper et al. (2019) reported that diaphragmatic breathing reduced physical and psychological stress in adults [46]. Shahriari et al. (2017) reported that the quality of life improved when deep diaphragmatic breathing was applied to older adults with breast and prostate cancer [47]. Chen et al. (2017) reported that diaphragmatic breathing reduced anxiety [48]. These studies reported that rehabilitation exercises and diaphragmatic breathing help in recovery from various diseases and reduce psychological stress, and anxiety. These results suggest that, in this study, the quality of life was improved by applying the aqueductal lymph drainage method, rather than the fact that rehabilitation exercises after gynecological cancer surgery alleviated physical symptoms. When rehabilitation exercises and diaphragmatic breathing were applied to patients, the quality of life was improved due to reduced psychological symptoms, such as anxiety and depression.

In this study, the manual lymph drainage method including rehabilitation exercise and the manual lymph drainage method including diaphragmatic breathing reduced the edema, pain, and improved the lower extremity function and quality of life in patients who underwent gynecological cancer surgery acoompanied by pelvic and aortic lymph node dissection. In particular, the manual lymph drainage method including rehabilitation

exercises, showed a significant difference compared with the manual lymph drainage method, including diaphragmatic breathing, in reducing pain and improving the physical symptoms.

This study had several limitations. It was not possible to limit various variables, such as lifestyle, occupation, and basic physical fitness of the patients, and the age of the patients was biased toward those in their 50s; therefore, it was not possible to include all the age groups. Thus, caution is needed in interpreting the study results. However, the fact that this study revealed the therapeutic effect of the manual lymphatic drainage method including rehabilitation exercise and the manual lymphatic drainage method including diaphragmatic breathing after surgery for gynecological cancer can be very useful from a clinical point of view.

Thus, to apply the results of this study to clinical practice in the future, additional research should be conducted by increasing the number of patients and controlling for variables to create the basic data necessary to develop a more systematic and efficient rehabilitation protocol for patients with gynecological cancer who underwent lymphadenectomy.

CONCLUSION

The manual lymphatic drainage including rehabilitation exercise and the manual lymph drainage method including diaphragmatic breathing are effective for patients with gynecological cancer after surgery in reducing edema, pain, improving lower extremity function and quality of life. These results indicate that the manual lymphatic drainage method applied gently to patients with gynecological cancer and rehabilitation exercises involving movements without straining the body can reduce the side effects or sequelae after surgery. Therefore, if the manual lymphatic drainage method, including rehabilitation exercises, is applied to patients with gynecological cancer who undergo pelvic and aortic lymph node dissection, postoperative recovery will be more effective and can be used as useful basic data for developing a rehabilitation protocol.

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