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## Abstract

**Introductions.** Lymphedema is an interstitial accumulation of protein-rich lymph fluid, due to the post-therapeutic alteration of lymphatic circulation in the upper limb. The appearance of lymphedema is favoured by a number of risk factors. All of these factors ultimately lead to a process of tissue fibrosis. **Materials and methods.** This study was carried out in an outpatient regimen, for a period of 12 months, in the kinetotherapy room, using massage elements for lymphatic drainage and kinetotherapy technique. The study group included 15 patients aged 27-65 years. **Results and discussions.** Patients evaluated the quality of life after surgery based on the physical and mental symptoms, which is why anxiety, pain reduction through massage and kinetotherapy give patients self-confidence as well as confidence in the recovery process. **Conclusions.** This complex programme that includes lymphatic drainage massage methods and kinetotherapy techniques should be applied individually, progressively, under the control of the kinetotherapist.

**Key words:** *lymphedema, kinetotherapy technique, lymphatic drainage massage,*

## Introduction

Lymphedema is an interstitial accumulation of protein-rich lymph fluid, due to the post-therapeutic alteration of lymphatic circulation in the upper limb. Surgery (lymphadenectomy) and radiation therapy for breast neoplasm can lead to secondary lymphedema of the arm. The increase in volume is not immediate. It can be developed in months or years after the end of treatment.

The appearance of lymphedema is favoured by a number of risk factors: obesity, upper limb infections, surgery on the limb at-risk, level of use of the limb (degree of repetitive effort (1,2), number of lymph nodes removed from the axilla (axillary dissection versus sentinel lymph node), radiotherapy, airplane travel, tamoxifen treatment by promoting thrombosis and coagulation disorders, history of upper limb lymphangitis (3,4).

All of these factors ultimately lead to a process of tissue fibrosis. Fibrosis compromises lymphatic vascular endothelium regeneration by altering endothelial cell proliferation. The microstructure of the altered lymphatic vessels will lead to a reverse circulation of the lymph, from the collecting vessels to the lymphatic capillaries, materialized by the accumulation of lymph in the interstitial space. Pathophysiologically, over time there is an interaction between the processes of

lymphangiogenesis, inflammation, fibrosis and lipid metabolism which will lead to fibrosis and the deposition of adipose tissue with the increase in volume of the upper limb (5).

In 2001, it was shown that 80% of patients may have lymphedema symptoms in the first 3 years after breast cancer surgery and 20% may develop lymphedema at a rate of 1% per year (6). Later, a larger study showed that the incidence of lymphedema varies between 8% and 56% at 2 years postoperatively, depending on the extent of lymphadenectomy and whether radiation therapy was applied or not (7). These situations cannot be generalized, considering that there have been reported cases of lymphedema of the arm at several days post-surgery, but also 30 years after surgery (8).

Studies have shown that unilateral breast cancer is more common in the left breast than in the right breast. Increased incidence in the left versus right breast gland was discovered nearly 40 years ago by Fellenbergs who studied 986 breast cancer cases between 1933-1935, diagnosed and treated at the Swiss Cancer Center (9).

Breast lymphatics drain into the first station represented by the homolateral axilla. In the axilla, there are about 30–50 lymph nodes. The axillary

architecture is systematized into six ganglion groups divided on 3 levels according to their position in relation to the pectoralis major. Neoplastic invasion is usually performed from level I to II and III, respectively (10). This stratification is used by specialists in order to characterise the malignant axillary microscopic invasion.

- Level I, lower, is drawn along the outer edge of the pectoralis minor
- Level II, the middle axilla, is under pectoralis minor
- Level III, the upper axilla is located along the inner edge of the pectoralis minor

The apical lymph nodes drain into the subclavicular lymphatic trunk. The differences between the lymphatic drainage systems between the left and right sides consist of: on the left side, the subclavicular lymphatic trunk drains into the thoracic canal, while on the right side, it drains into the right lymphatic canal. Alternatively, the lymphatic trunks can drain directly into one of the large cervical veins. The mammary tegument drains to the inferior axillary group, the latero-cervical and infraclavicular ganglia. The nipple and the breast areola drain into the subareolar lymphatic plexus.

Lymphedema is a complication recognized by surgeons and oncologists, but benefits from reduced attention compared to other complications of mammary antineoplastic therapy. Homolateral axillary lymphadenectomy, an integral part of breast cancer surgery, can lead to edema with increased frequency for axillary lymph node dissection compared to the sentinel lymph node technique (11,12).

A study from 2012 presents 3 mathematical models in order to help clinicians in their attempt to determine the possibility of lymphedema occurrence in the arm 5 years after surgery, for each patient, and the possibility of establishing preventive measures and the appropriate treatment (13). Thus, for patients with low or no risk factor, the probability of lymphedema occurrence is 3%, in patients with 2 risk factors it is 19%, and in those with 3 risk factors it is 38% (14).

The quality of life of patients after surgery and oncotherapy is altered, patients accusing physical symptoms that involve pain and limiting mobility but also psychological issues such as nervousness, anxiety, depression which are difficult to resolve. (15).

There are situations when the patient who has lymphedema is affected by the chronic dysfunction

of the musculoskeletal system that affects the surrounding joint and tissues. The pathogenesis, diagnosis and treatment of these conditions is a vibrant subject of research, which aims to increase the quality of life, while reducing the costs for healthcare (16).

Recovery methods in the case of occurrence of lymphedema are most of the times limited to the application of methods to reduce the volume of lymphedema. Some studies have shown that procedures for the progressive recovery of force gradually increase the physiological capacity of the arm. This increased capacity should reduce the risk that the daily activities put stress on the lymphatic system of the affected side (17). In addition to these procedures, the patient must be aware of the need to maintain her health in order to reduce the risk of developing lymphedema (2).

**Aim.** The present study aims at presenting the importance of complex decongestant therapy in patients with lymphedema and methods of improving the quality of life.

#### **Materials and methods**

The general objectives were to reduce the volume of lymphedema and to raise the awareness of the patients about maintaining the health status, to reduce the risk of developing lymphedema, to recognize the clinical symptoms of lymphedema, to assess the patients' compliance with the recovery programme.

Recovery occurs through the use of kinetic techniques, avoiding the use of other more invasive methods for which the results of their use in this pathology are not known (18,19).

The study was carried out in an outpatient regimen, for a period of 12 months, in the kinetotherapy room, using massage elements for lymphatic drainage and kinetotherapy techniques, using for this purpose the stick and the Bobath ball (20).

The daily recovery programme had 2 stages: in the first stage, lymphatic drainage massage, and in the second stage, medical gymnastics exercises and application of elastic bandages (lymph taping).

The criteria for inclusion in the study were:

- positive diagnosis of secondary lymphedema
- patients who had lymphedema symptoms
- patients' consent for the application of the recovery treatment

Exclusion criteria from the study:

1. diagnosis of lymphangitis, angioma, angiosarcoma, dermal papillomatosis, lymphatic cyst

2. decompensated chronic diseases
3. inflammatory processes
4. patients who did not consent to participate in the study.

Recovery sessions lasted 60 minutes, with a frequency of 3 times / week.

For 30 minutes the manual lymphatic drainage massage is applied (20).

For another 30 minutes the patients continue with gymnastic exercises to operate the muscular pump and to help the proper functioning of the lymphatic and venous vessels. The program included limb mobilizations, exercises for the thoracic and abdominal muscles, respiratory gymnastics (thoracic, diaphragmatic and abdominal) to provide the oxygen needed for gas exchange in the lungs. At the end of the kinetotherapy programme, elastic bandages were applied to maintain the effects obtained.

Regarding the lymphatic drainage, the “appeal method” and the “resorption method” were applied:

[1] pressure on the lymph nodes from the throat-Terminus, then on the subclavicular lymph nodes

- ✓ on the healthy side of the breast: circular movements were performed on the axillary lymph nodes, pumping-pushing movements over the breast, then intercostal circular movements, drainage of the parasternal lymph nodes
- ✓ on the operated side of the breast: circular movements are made towards the healthy axilla, above the operative scar and below the clavicle
- ✓ for the arm: circular movements from the axilla to the back of the arm, applying the resorption method from the elbow crease to the Terminus point
- ✓ for the forearm: the “bracelet pressure” technique is applied, distally to the proximally
- ✓ for the hand: circular movements on the fingers, palm

The psychological impact of the surgery on the patients was also taken into account.

The following parameters were appreciated at the beginning (M1) and at the end of the treatment (M2): pain and quality of life. For pain, the VAS (Analogue Visual Pain Scale) scale was used, in which the value 0 = no pain, the value 10 =

maximum pain and the QOL (Quality of life) scale was used to assess the quality of life.

Somatometry elements were also assessed, respectively the perimeter of the arm (in 3 points), the forearm and the fist, using the measuring tape. The treatment lasted for 5 weeks.

### Statistical analysis

To record the data obtained from patients, the Microsoft Excel program was used, namely, the mean, median, standard deviation, Student’s t test, in order to compare the obtained results and to verify the working hypothesis. The Student’s t test allowed us to determine the value of the p index, which may indicate an error regarding the working hypothesis.

### Results and discussions

The study group included 15 patients aged 27-65 years, 10 (60.6%) from urban areas and 5 (39.4%) from rural areas.

**Table no. 1. Distribution of patients per age groups**

	Age group (years)	Number
1	27-35	6(40%)
2	36-45	3(20%)
3	46-55	2(13.33%)
4	56-65	4(26.67%)

The duration of treatment was 5 weeks, with a frequency of 3 sessions per week. The techniques of drainage massage and the complete programme of kinetotherapy were applied. The decrease of the pain parameter and the increase of the quality of life, assessed on the VAS and QOL scale, were noted.

Table no. 2. Evolution of pain and quality of life of the patients in the group

Scale	Statistics	Moment M1	Moment M2
VAS	Mean/STD deviation	8±0.71	6±0.91
QOL	Mean/STD deviation	76±4.56	88±4.19

After measuring the perimeter of the arm in 3 points (P1, P2, P3) and at the 2 evaluation moments, a reduction of the values for all measurement points compared to the initial values was noted.

Table no. 3. Evolution of the arm perimeter in the patients in the group

Arm perimeter	P1		P2		P3	
	M1	M2	M1	M2	M1	M2
Statistics	33±2.74	31.5±2.21	30±2.42	28±2.29	27±3.33	26±3.39

Regarding the forearm and fist measurement, a reduction of the final values compared with the initial ones was noted, as well.

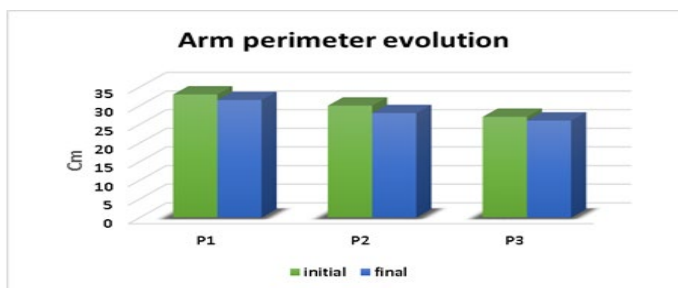


Fig. 1. Arm perimeter evolution in the study patients

Table no 3. Evolution of forearm and fist perimeter in the study patients

Perimeter	Moment M1	Moment M2
Forearm	22±1.81	21±1.79
Fist	17±1.41	16±1.06

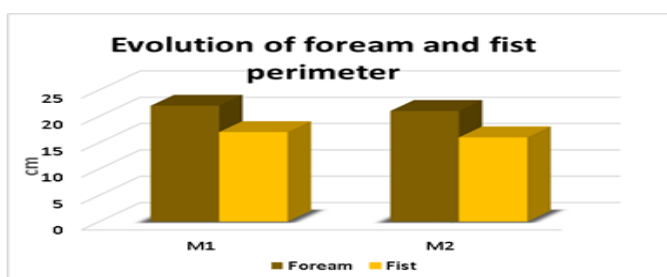


Fig. 2. Evolution of the perimeter of forearm and fist in the study patients

The obtained results allow us to affirm that the application of lymphatic drainage massage and the kinetotherapy programme as early as possible, as well as maintaining the effects obtained by using the elastic bandages ensures pain reduction, decreasing the perimeter of the arm, forearm and fist, allowing these patients to carry out daily activities with average functional capacity.

For the pain and quality of life assessment scales, the results obtained were statistically significant, the p value being less than 0.05

Table no. 4. The value of the Student's t-test for VAS and QOL scales

Scale	VAS	QOL
T test	0.0127	0.0029

By measuring the perimeters at the level of the upper limb segments (arm, forearm and hand) it was found that the Student's t test had statistically significant values in the arm at the 3 measurement points,  $p < 0.05$ . The same statistically significant results were obtained when measuring the perimeter for the forearm and fist.

Table no. 5. The value of the Student's t test for the perimeter of the upper limb

Perimeter	P1	P2	P3	Forearm	Fist
T test	0.0003	0.0007	0.0002	0.0003	0.0006

Patients evaluated the quality of life after surgery based on the physical (pain, limiting mobility, physical appearance) and mental (nervousness, anxiety, depression, irritability) symptoms, which is why anxiety, pain reduction through massage and kinetotherapy give patients self-confidence as well as confidence in the recovery process, which facilitates the faster reintegration of patients, in family and socio-professional life (21,22).

Further studies are needed to establish a broader protocol that combines different modalities of physical activity, frequencies, intensities and durations needed to improve specific outcomes among women who have undergone adjuvant therapy (23,24).

### Conclusions:

Given that between 20% and 30% of patients develop lymphedema, an early recovery programme after surgery, can prevent lymphedema occurrence and reduce the complications associated with it. This complex programme that includes lymphatic drainage massage methods and kinetotherapy techniques should be applied individually, progressively, under the control of the kinetotherapist and allows enhancing the quality of life by improving the algal, functional, vasomotor symptoms.

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**Informed consent:** *An informed consent was obtained from the patients included in this study.*

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