

Effectiveness of Endermologie Technique in Post-Mastectomy Lymphedema

FATMA A. MOHAMED, PT.D* and HOSSAM EL-DIN M. ABOL-ATTA, M.D.**

The Departments of Physical Therapy for Cardiovascular/Respiratory Disorder & Geriatrics, Faculty of Physical Therapy, Cairo University and Plastic Surgery, Faculty of Medicine, Ain Shams University***

Abstract

Background: Lymphedema is a common sequela of breast cancer treatment representing a complex therapeutic challenge.

Study Aim: To study the effectiveness of Endermologie therapy on reducing arm swelling in women post mastectomy.

Subjects and Methods: Forty women with unilateral post mastectomy lymphedema were assigned for the study, aged from 30 to 50 years. They were divided into two groups of equal number, study group received Endermologie therapy twice weekly for 4 weeks and a compression bandaging and a control group received a compression bandaging for 4 weeks. Circumferential measurements of upper limb at the levels of wrist, 10Cm distal and 15Cm proximal to lateral epicondyle were taken before and after finishing the program.

Results: The results showed significant reduction in arm swelling in the study as compared to the control group (p -value <0.05) however both groups showed significant improvement (p -value <0.001).

Conclusion: Endermologie therapy can be introduced as a safe modality for post mastectomy lymphedema.

Key Words: Post mastectomy lymphedema – Endermologie therapy – Compression bandaging.

Introduction

BREAST cancer is the most commonly diagnosed cancer in women and accounts for approximately 15% of all cancer deaths in women [1]. Lymphedema remains a significant clinical problem, with an incidence of 1:5 women developing the condition following treatment for breast cancer which may arise immediately or many years after treatment [2].

It is a condition of accumulation of protein-rich fluid in soft tissues resulting from overload of these lymphatics in which lymph volume exceeds

transport capabilities. Persistent swelling and the build-up of stagnant protein eventually lead to repeated bouts of cellulitis, lymphangitis and fibrosis within the affected limb [3].

Lymphedema as the most common sequela of breast cancer therapy changes functional abilities and may affect a patient's psychosocial adjustment and overall quality of life and represents a complex therapeutic challenge for the physician [4]. Problems associated with lymphedema include pain, feeling of discomfort and heaviness, difficulties with physical mobility, physiological distress, recurrent infections and social isolation which all negatively affect the quality of life of the patient [1].

Although there is no cure for lymphedema the treatment should begin as soon as possible. The main goals of treatment are to control swelling, relieve the symptoms, prevent the swelling from worsening over time as well as to restore the function and cosmesis. Patients with lymphedema can be treated with medications or surgery, but these treatments have been largely unsuccessful. Because medicines are of little benefit and can sometimes be harmful, the most common approaches are non pharmacologic [3,5].

Two main physical therapy interventions were identified for the management of breast cancer related lymphedema: Complex decongestive therapy (CDT) to promote venous and lymphatic flow and exercise to restore range of motion, increase muscle strength, restore or maximize upper extremity function and control swelling [6].

Endermologie is a machine-assisted massage system that allows positive pressure rolling, in conjunction with applied negative pressure to the skin and subcutaneous tissues. It involves the use of a motorized device with two adjustable rollers

Correspondence to: Dr. Fatma A. Mohamed, The Department of Physical Therapy for Cardiovascular/Respiratory Disorder, Faculty of Physical Therapy, Cairo University

and controlled suction, which creates a symmetrical skin-fold allowing for smooth and regulated deep tissue mobilization. It was originally developed to soften scars but now it is widely used as an alternative method for altering fat distribution in the subcutaneous plane [7,8].

Lymphedema treatment remains a problem even with modern treatment modalities, since clear therapeutic protocols do not exist [3].

The purpose of the current study was to study the effectiveness of Endermologie technique in the reduction of post mastectomy lymphedema.

Subjects and Methods

Forty women treated for unilateral breast cancer with secondary upper limb lymphedema post mastectomy were recruited from the out patients clinic of Nasser Medical Institute and National Tumor Institute in Cairo Governate, Egypt. Their age was ranged from 30 to 50 years. They were diagnosed as having secondary lymphedema of the upper limb with a limb circumference difference of at least 2cm compared to the contra lateral limb, all women have finished treatment with radiotherapy and/or chemotherapy at least six months before the study began and all of them have signed a consent of approval to participate in the study. Those who had underlying primary lymphedema, recurrent cancer, current or recent cellulitis, or who had received active treatment in the past month were excluded from the study. The women were divided into two groups of equal number, the study group who received Endermologie therapy sessions twice weekly for four weeks (total 8 sessions) with compression bandaging and the control group who received compression bandaging for four weeks.

All women were examined and have received general explanation about the evaluation and the treatment procedures.

Assessment of limb circumferential measurement by the tape measurement were performed at three points on both arms: The wrist, 10cm distal to the lateral epicondyle and 15cm proximal to the lateral epicondyle. Measurements have been taken for all women participated in the study before beginning of applying the treatment and after completing the treatment (4 weeks), with the patient in supine lying position.

All the women of both groups have received compression bandaging for four weeks and the women in the study group received eight sessions by Endermologie system (LPG Cellu M6 Key

module machine, made in France), two sessions per week for four weeks. Each session was 20 minutes at the posterior thorax, upper arm, forearm and the hand.

Statistical analysis:

Data was collected and statistically analyzed using the SPSS program. The paired sample student *t*-test was used to analyze within group variables and the independent sample *t*-test was used to analyze between group variables, where $p < 0.05$ is significant and $p \leq 0.001$ is highly significant.

Results

Participants characteristics:

Forty women with unilateral post-mastectomy lymphedema were participated in this study who randomly assigned into two groups of equal number. The mean of their age, weight and height are shown in Table (1). In the study group the mean of age was 44.1 (± 3.55) years, the mean of weight was 75.95 (± 6.47) kilograms and the mean of height was 164.1 (± 6.78) centimeters while in the control group the mean of age was 43.95 (± 3.53) years, the mean of weight was 78.4 (± 6.97) kilograms and the mean of height was 165.65 (± 7.14) centimeters with non statistical significant differences between both groups regarding the ages, weights, and heights ($p > 0.05$).

Table (1): Demographic data of patients in the study and the control groups.

| Items | Study group | Control group | <i>p</i> -value |
|-------------|------------------|-------------------|-----------------|
| | Mean \pm SD | Mean \pm SD | |
| Age (yrs) | 44.1 \pm 3.55 | 43.95 \pm 3.53 | >0.05 |
| Weight (Kg) | 75.95 \pm 6.47 | 78.4 \pm 6.97 | >0.05 |
| Height (cm) | 164.1 \pm 6.78 | 165.65 \pm 7.14 | >0.05 |

SD: Standard deviation Yrs: Years Kg: Kilogram
cm: Centimeter $p > 0.05$: Non-significant.

Comparison of the upper limb circumference as shown in Table (2) at pre treatment and post treatment in the study group revealed high statistical significant difference ($p < 0.001$) at the three levels of measurements (wrist, 10cm distal to lateral epicondyle, 15cm proximal to lateral epicondyle) as at the pre treatment the circumference were 19.02 (± 1.97) cm, 34.47 (± 5.23) cm and 38.4 (± 3.32) cm respectively while the upper limb circumference at the post treatment were 17.37 (± 1.62) cm, 31.9 (± 5.18) cm and 35.67 (± 2.87) cm respectively.

High statistical significant difference ($p < 0.001$) was found when comparing the upper limb circum-

ference at pre treatment and post treatment in the control group at the three levels of measurements (wrist, 10 cm distal to lateral epicondyle, 15cm proximal to lateral epicondyle) as at the pre treatment the circumference were 18.95 (± 1.95) cm, 35.8 (± 4.5) cm and 38.35 (± 2.62) cm respectively while the upper limb circumference at the post treatment were 18.52 (± 1.86) cm, 35.3 (± 4.44) cm and 37.87 (± 2.61) cm respectively as shown in table (2).

Comparison of wrist joint circumference, circumference at 10cm distal to lateral epicondyle and circumference at 15cm proximal to lateral epicondyle pre and post treatment between the study and the control groups showed no statistical significant differences at the pretreatment ($p > 0.05$) which changed into statistical significant differences at the post treatment ($p < 0.05$) at the three levels of measurements in favor of the study group as shown in table (2).

Table (2): Comparison of limb circumference within each group and between both groups at pre and post treatment.

| | Wrist joint circumference | | 10 Cm distal to lateral epicondyle circumference | | 15 Cm proximal to lateral epicondyle circumference | | Within group |
|-------------------------------|---------------------------|------------------|--|-----------------|--|------------------|--------------|
| | Mean \pm SD | | Mean \pm SD | | Mean \pm SD | | |
| | Pre | Post | Pre | Post | Pre | Post | |
| Study group (Mean \pm SD) | 19.02 \pm 1.97 | 17.37 \pm 1.62 | 34.47 \pm 5.23 | 31.9 \pm 5.18 | 38.4 \pm 3.32 | 35.67 \pm 2.87 | <0.001 |
| Control group (Mean \pm SD) | 18.95 \pm 1.95 | 18.52 \pm 1.86 | 35.8 \pm 4.5 | 35.3 \pm 4.44 | 38.35 \pm 2.62 | 37.87 \pm 2.61 | <0.001 |
| <i>p</i> -value | >0.05 | <0.05 | >0.05 | <0.05 | >0.05 | <0.05 | |

SD: Standard Deviation.

$p < 0.05$: Significant.

$p > 0.05$: Non-significant.

$p < 0.001$: Highly significant.

Discussion

This study was designed to determine if the treatment with Endermologie technique has an effect on reducing the secondary lymphedema in women post mastectomy. The results of this study showed reduction of secondary arm lymphedema post mastectomy in all levels of measurement of the upper limb in both groups; however the decrease of the arm circumference were significantly higher in the group received the Endermologie treatment which may be due to facilitation of the lymphatic drainage from the affected limb by the use of the mechanized treatment head that allow continuous folding and unfolding of the skin under the continuous action of the rollers allowing for smooth and regulated deep tissue mobilization.

As the viscosity of the subcutaneous fat layer decreases, blood flow and lymphatic drainage increase, facilitating the elimination of excess fluid and metabolites and improving overall cellular function [8].

Although the two treatment protocols (Endermologie and compression bandaging) produced reduction in the affected arm swelling, the Endermologie protocol induced additional subjective benefits reported by the patients in terms of an

improvement in arm range of movement, decrease of accompanied pain and softening of fibrotic tissues of the swollen upper limb.

The Endermologie machine was frequently used in the cosmetic field in the treatment of cellulite and body contouring [7], there are not enough studies carried on about its therapeutic role in the treatment of secondary lymphedema as the machine therapeutic techniques considered to be new. This study will add more support in using the Endermologie technique in the future as an accredited physical therapy method for the treatment of lymphedema as there is no absolute cure for lymphedema yet without hazardous side effects and the Endermologie machine has no side effects.

The result of this study came in agreement with the result of the study conducted by Campisi et al., who found decrease of the excess limb volume from 5% to 10% after Endermologie therapy and reduction of the fibrotic tissue components, softening of the skin and superficial tissue through improving the lymphatic drainage of the affected limb in patients with secondary lymphedema of arm and leg treated by combining physical therapy through applying Endermologie technique along with microsurgical operations [9].

Endermologie therapy accompanied by elastic compressive treatment two sessions a week for four weeks induced significant reduction in the circumference of the affected limb as well as significant improvement of microcirculation of the cutaneous oxygenation and of the interstitial metabolism in the patients underwent surgery for malleolar and calf lipolymphedema [10].

Moseley et al., reported that both manual lymph drainage and Endermologie treatment plus compression bandaging applied over a minimum of two weeks are beneficial for the treatment of secondary arm lymphedema but Endermologie treatment has a 33% shorter treatment time than manual lymph drainage [8].

Conclusion:

It can be concluded that Endermologie therapy for a post-mastectomy upper limb lymphedema induced both objective improvement in the form of decrease upper limb swelling and subjective improvements in the form of decreased pain and improved the mobility of the affected limb. Upon the results of the current study Endermologie therapy can be recommended to patients with upper limb secondary lymphedema as a safe therapy without side effects.

Recommendations:

It is recommended that future studies are needed to confirm the effects of Endermologie technique on increasing the range of movement and decreasing the pain in the affected upper limb. Other studies are needed with longer follow-up to study the maintenance of the result over time and other studies are needed to study the effect of Endermologie technique on lower limb secondary lymphedema and also on primary lymphedema.

References

- 1- MORRELL R.M., HALYARD M.Y., SCHILD S.E., ALI M.S., GUNDERSON L.L. and POCKAJ B.A.: Breast cancer-related lymphedema. *Mayo. Clin. Proc.*, 80 (11): 1480-1484, 2005.
- 2- CLARK B., SITZIA J. and HARLOW W.: Incidence and risk of arm oedema following treatment for breast cancer: A Three-year follow-up study. *QJM*, 98 (5): 343-348, 2005.
- 3- PETREK J.A., PRESSMAN P.I. & SMITH R.A.: Lymphedema: Current Issues in Research and Management. *C.A. Cancer. J. Clin.*, 50: 292-307, 2000.
- 4- AHMED R.L., PRIZMENT A., LAZOVICH D., SCHMITZ K.H. and FOLSOM A.R.: Lymphedema and quality of life in breast cancer survivors: The Iowa Women's Health Study. *J. Clin. Oncol.*, 26 (35): 5689-96, 2008.
- 5- KAVANAH M. and LA MORTE W.W.: Living with Lymphoedema in Ireland. *Arch. Surg.*, 137: 1253-1257, 2009.
- 6- CHEIFETZ O., HALEY L. and Breast Cancer Action: Management of secondary lymphedema related to breast cancer. *Can. Fam. Physician*, 56 (12): 1277-1284, 2010.
- 7- CHANG P., WISEMAN J., JACOBY T., SALISBURY A.V. and ERSEK R.A.: Noninvasive mechanical body contouring: (Endermologie) a one-year clinical outcome study update. *Aesthetic Plast. Surg.*, 22 (2): 145-53, 1998.
- 8- MOSELEY A.L., PILLER N.B., DOUGLASS J. and ESPLIN M.: Comparison of the effectiveness of MLD and LPG technique. *Journal of Lymphoedema*, 2 (2): 30-36, 2007.
- 9- CAMPISI C., BOCCARDO F., ZILLI A., MACCIO A., FERREIRA DEAZEVEDO W.J.R., STEINGPMES C. and DEMELOCOUTO E.: LPG Systems in the Treatment of Peripheral Lymphedema. *The European Journal of Lymphology*, 10 (35-36): 14-15, 2002.
- 10- BACCI P.A., SCATOLINI M., LEONARDI S., BELARDI P. and MANCINI S.: Vibroassisted Liposuction and Endermologie for Lipolymphedema, *The European Journal of Lymphology*, 10 (35-36): 9-13, 2002.