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Lymph drainage of the cephalic and posterior chains and manual compression along the inside of the arm

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Abstract

Introduction: Breast cancer is a major cause of mortality among women and one complication of treatment is the development of lymphedema.

Objective: The objective of the present study was to drain each of these chains separately for one hour each on three different days and compare, using volumetry and bioimpedance, the variations in limb volume with one hour without any intervention.

Method: Twenty patients with breast cancer-related lymphedema aged from 49 to 71 years were enrolled in this study in 2013 and 2014. They were subjected to one hour of drainage of either the cephalic chain, the posterior chain, manual compression along the path of vessels affected by lymph node dissection or one hour without the use of therapy (control) on four different days. The draining sequence was decided by lottery with assessment of volume changes being achieved by water displacement volumetry and bioimpedance (InBody S10) before and after each session.

Results: Statistically significant reductions of the edema were observed with the three techniques employed (p-value <0.05).

Conclusion: When therapies or maneuvers are combined, it is important to individually assess each one. The drainage maneuvers used in this study are effective however care must be taken when there is edema of the hands.

Keywords: Lymphedema, Godoy Method, Manual Lymphatic Drainage, Treatment

Introduction

Breast cancer is a major cause of mortality among women and one complication of treatment is the development of lymphedema. The literature reports that between 5 and 56% of patients submitted to breast cancer treatment, especially surgery including axillary dissection, develop

lymphedema. [1] The treatment of this disease causes many physical and psychological disorders and interferes with the quality of life and social aspects of patients. [2-5]

Diagnosis of lymphedema is based on clinical history, physical examination and laboratory tests. The main supplementary examination is volumetry, which is used to identify whether the volume of edema characterizes clinical stage lymphedema. Volumetry, perometry and bioimpedance are the main methods used to define lymphedema. [6]

The main treatment techniques are manual lymph drainage, myolymphokinetic exercises and activities, and compression mechanisms. However, psychological aspects and social rehabilitation also need to be addressed.

The best-known manual lymph drainage techniques are the Vodder and Leduc methods. [7,8] In recent years Godoy & Godoy developed a new concept of lymph drainage based on linear sliding movements toward corresponding nodes. [9]

This technique has been adapted to the pathophysiology of breast cancer-related lymphedema to treat both the chest and arm. This adaptation consists of manual compression followed by linear sliding movements of the regions associated to the cephalic and posterior chains and just manual compression along the route of vessels affected by lymph node removal. [9] The objective of the present study was to drain each of these chains separately for one hour each on three different days and compare, using volumetry and bioimpedance, the variations in limb volume with one hour without any intervention.

Method

Twenty patients with lymphedema after treatment of breast cancer, aged from 49 to 71 years (mean age: 61) were enrolled in this study in 2013 and 2014. The treatment of breast cancer included surgery with dissection of axillary lymph nodes, chemotherapy and radiotherapy. Lymphedema developed between 1 and 5 years after breast cancer treatment. They were subjected to one hour of drainage of either the cephalic chain, the posterior chain, manual compression along the path of vessels affected by lymph node dissection or one hour without the use of therapy (control) on four different days. The draining sequence was decided by lottery with assessment of volume changes being achieved by water displacement volumetry and bioimpedance (InBody S10) before and after each session.

The paired t-test, Kruskal-Wallis and Conover-Inman tests were used for statistical analysis with an alpha error of 5% being considered acceptable.

The study was approved Ethical Committee Medicine School of Sao Jose do Rio Preto-Brazil number 387/2011 – The Brazilian Clinical Trials Registry / Registro Brasileiro de Ensaios Clínicos (ReBEC) 453.

Results

Statistically significant reductions of the edema were observed with the three techniques employed (p-value <0.05), table 1. However, in patients with hand edema, no reduction and sometimes even an increase in the volume was observed on draining the cephalic chain; for patients with hands without edema the reduction was statistically significant (paired t-test: p-value = 0.04). Compared with the day of no treatment (control), drainage was statistically superior for all evaluations, figure 1.

The results of assessments by bioimpedance were similar to those by volumetry. In patients with hands without edema, there were no significant differences between the reductions in volume comparing the three drainage pathways (Kruskal-Wallis: p-value = 0.9).

Table 1. Volume (mL) variations before, after treatment and control group

Manual compression (mL)	Control (mL)	Posterior chain (mL)	Cephalic chain (mL)
-15	19	-46	-34
-27	14	-25	-24
-52	38	-35	-89
-90	3	-15	-30
-60	41	-25	-26
-87	64	-68	-51
-6	-2	-30	2
-64	45	-67	-25
-36	13	-41	12
-8	8	-58	-38
-15	19	-46	-34
-27	14	-25	-24
-52	38	-35	-89
-85	3	-15	-30
-60	41	-25	-26
-94	64	-68	-51
-6	-2	-30	-12
-64	45	-67	-25
-36	13	-41	10
-8	8	-58	-38

Figure 1 Volume variations (ml) in the drainage cephalic, posterior chains,manual compression and control group

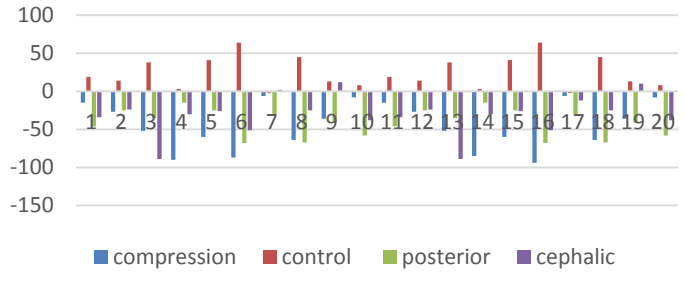

Figure 1. Volume variations (mL) in the drainage cephalic, posterior, chains, manual compression and group control

Discussion

This study evaluated specific maneuvers of the Godoy and Godoy Manual Lymphatic Drainage technique adapted for breast cancer-related lymphedema. In particular, three maneuvers were assessed (linear drainage of the cephalic and posterior chains and compression along the route of vessels affected by the removal of lymph nodes) all of which were effective in reducing the volume of lymphedematous arms. However, when the back of the hand is swollen, arm edema does not diminish during drainage of the cephalic chain, and sometimes the edema worsens. This finding suggests that the cephalic chain is probably damaged during radiotherapy. There are no published studies that evaluate the effects of these different maneuvers.

Another assessment was to see whether one of these maneuvers was better than the others to reduce the volume of arm edema. No significant difference was found between the three maneuvers, except in cases with hand edema, and so all three can be used.

It is important to identify whether all the types of maneuvers used during lymph drainage are really necessary or whether specific maneuvers produce better or worse results. This evaluation may be an important contribution to the evolution of lymphedema treatment techniques.

Meta-analyzes show that the combination of therapies can reduce edema, especially when associated with compression mechanisms. However, studies question the effectiveness of lymph drainage alone. These data suggest that a better standardization of lymph drainage techniques is required with evaluations to identify the most effective ways to reduce edema.

To illustrate further the need for standardization and to evaluate the different approaches to drainage, a pilot study showed that 30 minutes of Mechanical Lymphatic Therapy using the RAGodoy® apparatus did not reduce the edema when evaluated by volumetry, but did reduce the swelling according to bioimpedance. However, when Mechanical Lymphatic Therapy was extended to one hour, there was a significant volumetric reduction. This suggests that the time of therapy should be at least one hour. Therefore, the best therapeutic option should be standardized.

The only way to mobilize macromolecules and transport lymph is through lymph capillaries to the lymph collectors; in the case of axillary dissection, some routes are blocked. Moreover, the natural evolution of the lymphatic system with blocked collectors is that the pressure increases over time leading to hypertension. Thus, the identification of alternative routes is necessary with the adaption of drainage techniques to the pathophysiology of specific conditions.

Local compression aims to increase pressure in the edematous tissue, stimulating the formation of lymph thereby moving macromolecules from the interstitial space into functional lymph capillaries. The capillaries flow to valved pre-collectors that exert a contractile effect driving the lymph back into circulation.

Lymphoscintigraphic evaluations and fluoroscopy may contribute to identify patent collectors, and then the drainage technique used should be adapted to the pathophysiology. It is possible to identify a vessel that seems to be patent, but on its path there may be several collectors that are blocked. In this case, compression followed by sliding should not be performed. Therefore, identification of the patent collectors by fluoroscopy or lymphoscintigraphy will not always improve lymph drainage.

Conclusion

When therapies or maneuvers are combined, it is important to individually assess each one. The drainage maneuvers used in this study are effective however care must be taken when there is edema of the hands.

Conflict Interest

The authors declare that there is no conflict of interest.

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