

Mechanical lymphatic drainage in the treatment of arm lymphedema

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Abstract

Exercising is one of the three cornerstones in the treatment of lymphedema together with contention mechanisms and lymphatic drainage. The aim of the current study was to evaluate a new method of mechanic lymphatic drainage. Volumetric reductions were evaluated after passive exercises in 25 patients with arm lymphedema resulting from breast cancer treatment. Their ages ranged between 42 and 86 years old. All patients were submitted to one-hour sessions using the RAGodoy[®] electromechanical apparatus which performs from 15 to 25 elbow bending and stretching exercises per minute. Volumetry, using the water displacement technique, was performed before and after the sessions. The paired t-test was employed for statistical analysis with an alpha error of less than 5% being considered acceptable. The reduction in volume was significant (P -value < 0.001) with a mean initial volume of 2026.4 and final volume of 1967.2 giving a mean loss of 59.2 mL. The RAGodoy[®] apparatus was efficient to reduce the volume of lymphedematous arms and is an option for the treatment of lymphedema.

Key words: Apparatus, lymphatic drainage, lymphedema, treatment

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Introduction

Lymphedema is characterized by an abnormal accumulation of fluids and other substances in the tissue caused by a failure of the lymphatic drainage system associated to an insufficiency of extralymphatic proteolysis of the cellular interstice and mobilization of macromolecules.^[1,2] There is no specific therapy for lymphedema however an association of therapies,^[3] including lymphatic drainage,^[4-6] myolymphokinetic exercises,^[7,8] stockings and bandages,^[9-12] personal hygiene and care while performing day-to-day activities,^[13,14] psychological support,^[15,16] and drugs with a lymphokinetic action^[17] is recommended. Exercising is one of the three cornerstones in the treatment of lymphedema together with contention mechanisms and lymphatic drainage. However, there are few studies evaluating mechanical lymphatic drainage of the arms.^[18,19]

The aim of the current study was to evaluate a new method of mechanical lymphatic drainage utilizing the RAGodoy[®] apparatus.

Method

Volumetric reductions were evaluated after passive exercises in 25 patients with arm lymphedema resulting from breast cancer treatment. Their ages ranged between 42 and 86 years old. The diagnosis of lymphedema was clinical confirmed by lymphoscintigraphy and volumetry. Lymphedema of the limbs was considered when the difference in volume was more than 200 mL when compared with the contralateral arm. Exclusion criteria were active infections and joint or neurologic limitations. Patients from the Lymphedema Treatment Center were selected according to the order of arrival and acceptance to participate in the study. All patients were submitted to a one-hour session using the RAGodoy[®] electromechanical apparatus which performs from 15 to 25 elbow bending and stretching exercises per minute. Volumetry was performed using the water displacement technique before and after the one-hour session. The paired t-test was utilized for statistical analysis with an alpha error of less than 5% being considered acceptable.

The study was approved by the Research Ethics Committee of the Institute of Biosciences, Languages and Exact Sciences (IBILCE) in São José do Rio Preto, Brazil.

Results

The reduction in the volume was significant (P -value < 0.001) with a mean initial volume of 2026.4 and a final volume of 1967.2 giving an average loss of 59.2 mL. Of the 25 evaluations there was a reduction in 23 assessments and in only two there was an increase in volume. Table 1 shows the volumetric measurements before and after each session.

Discussion

The current study demonstrates a new option of mechanical lymphatic drainage performed using a new apparatus specifically developed for the treatment of arm lymphedema. This apparatus was developed taking into account the venous and lymphatic return physiologies that utilize contraction mechanisms within the muscles to produce lymphovenous drainage. No apparatus has been reported in the literature with this characteristic of lymphatic drainage for the arms. The authors developed an apparatus with similar characteristics for the legs.^[19-21]

An association of therapies is suggested for the treatment of lymphedema with this new approach being another option for arm lymphedema.

The precautions related to the use of the apparatus are the velocity and the time that each patient will tolerate exercising. Exercising can be performed continuously or at intervals depending on the patient. An increase of volume occurred in two patients during the exercising, however these patients were reevaluated after other one-hour sessions of exercises and they experienced a reduction in the volume of the arm. Hence, appropriate guidance is important for patients as they should not try to control the movements; they must be performed passively by the apparatus. It is important that the contraction mechanism drains more than the capacity of capillary filtration. Thus, passive exercises are better in the treatment of lymphedema because they demand a lower blood supply to the muscles and hence less capillary filtration.

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Table 1. Shows the initial volume and the volume after a one-hour session and the difference in mL

Initial volume / mL	Volume after 1 hour / mL	Difference / mL
1698	1532	-163
1917	1864	-53
1993	1896	-97
1552	1487	-65
2649	2536	-113
2236	2179	-57
2843	2735	-108
1657	1562	-95
1342	1268	-74
2680	2647	-33
2166	2086	-80
1610	1707	493
1764	1729	-35
2597	2591	-8
2608	2543	-65
2246	2024	-22
1436	1412	-24
2136	2008	-28
1740	1708	-32
1634	1612	-22
1319	1496	+177
2696	2538	-158
2038	1942	-96
2397	2395	-2
1707	1684	-23
Mean 2026.4	Mean 1967.2	Mean difference 59.2*

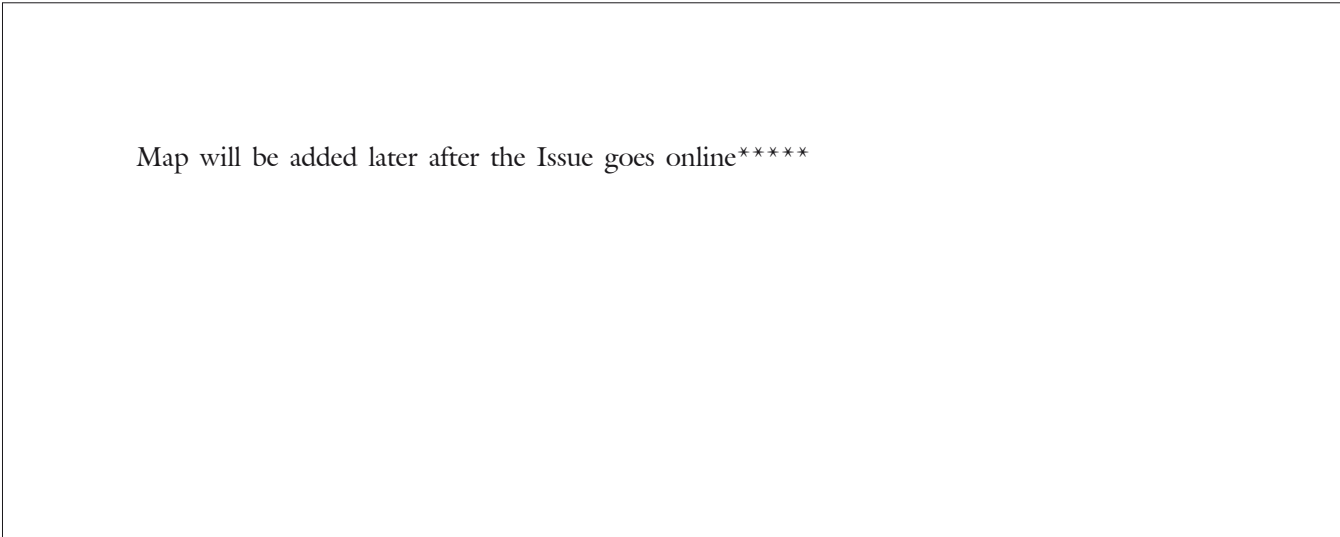
P -value < 0.001 - paired t-test

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