

Association of Godoy & Godoy contention with mechanism with apparatus-assisted exercises in patients with arm lymphedema after breast cancer

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Aim: The aim of the current study was to evaluate the reduction in the volume of the upper limbs with lymphedema after exercises using the apparatus-assisted program associated with contention mechanism.

Patients and method: Twenty-eight female patients were selected and referred for evaluation and treatment of lymphedema after breast cancer therapy. The ages of the women ranged from 42 to 72 years with a mean age of 57 years. Inclusion criteria were treatment of cancer associated to a difference of at least 200 mL between the edematous and the contralateral limbs. Patients with active infections, skin lesions, and active disease were not included in the study. Four series of exercises using devices based on pedals, pulleys, a horizontal reflexion bar, and an elevation bar were selected. The participants were advised about the form of exercise: 15 minutes for each device, low intensity (less than 10 movements per minute), in the seated position, and the use of contention. Water displacement volumetry was performed before and after the 60-minute exercise session. The paired *t*-test was utilized with an alpha error of 5% considered acceptable (*P* value < 0.05).

Results: The mean difference between the volumetric measures before and after exercise was significant, with all the participants having reductions in the volume of the limbs using the four selected devices over time and at an intensity determined by this study.

Conclusion: Association of a Godoy and Godoy contention during apparatus-assisted exercise reduced the edema in patients with lymphedema of the upper limbs.

Keywords: lymphedema, exercises, devices, treatment

Introduction

Lymphedema is one complication of breast cancer treatment. The hypothesis of the authors is that these procedures damage the lymphatic system and make drainage of proteins and macromolecules from the cell interstice difficult.¹

When lymphedema is established, the degree of dysfunction is great due to physical factors such as the reduction in joint mobility causing reductions in the amplitude of movements, weight of the limb, pain, and disability in performing day-to-day tasks.² Apart from this, the psychological state of patients is affected from the moment of breaking the news to coping with the treatment and any possible sequels. Sequels of mastectomized patients require multidisciplinary care,³ both in the prevention and treatment. On the other hand, there is consensus in respect to treatment with an association of therapies being recommended^{4,5} including lymph drainage,⁶⁻¹⁰ lymphokinetic

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exercises,^{11,12} stockings and bandages,^{13–15} hygiene and day-to-day care,¹⁶ investigation of quality of life,¹⁷ nutritional support,¹⁸ psychological support,^{19,20} and lymphokinetic medications.²¹

In classifying the forms of treatment of lymphedema, lymphokinetic exercises, lymph drainage, and contention mechanisms constitute the basis of the association of techniques. The exercises are defined as programmed and structured muscular activities to improve physical condition and health, but without any objective of competing.²² Thus, lymphokinetic exercises are those that, through muscular activities, favor venolymphatic circulation,²³ however their biomechanic principles, intensity, and duration should be further investigated.²⁴

Studies show that low-intensity exercises can be performed by patients with arm lymphedema without risk of worsening the edema. Exercises without the sleeve may be of benefit provided the compression sleeve is worn regularly.²⁵ In breast cancer survivors at risk for lymphedema, a program of slowly progressive weight lifting compared with no exercise did not result in increased incidence of lymphedema and reduced symptoms, and increased strength.^{26,27}

The aim of the current study was to evaluate the reduction in the volume of the upper limbs with lymphedema after exercises using the apparatus-assisted program associated with contention mechanism.

Patients and method

Twenty-eight female patients were selected and referred to the Godoy Clinic to evaluate and treat lymphedema. All patients underwent radiotherapy, chemotherapy, and surgery with axillary lymph node resection. The ages ranged from 42 to 72 years with a mean age of 57 years. Inclusion criteria were a history of breast cancer treatment followed by edema of the arm with a difference between the affected and contralateral limbs of more than 200 mL. Women with active infections, skin lesions, or other active diseases were not included in the study. All participants were informed about the nature of the study and signed written consent forms. Four types of exercises using apparatuses (pedal, pulleys, horizontal bar, and elevation bar; Figure 1) were selected. The patients received guidance related to how the exercise should be performed: time (15 minutes using each apparatus), low intensity (less than 10 movements per minute), posture (seated when exercising), and the use of Godoy and Godoy contention (a sleeve made from a cotton–polyester material). Water displacement volumetry was performed before and after 60 minutes of exercising,



Figure 1 Table with four exercise apparatuses for the arms.

with the displaced water measured on digital weighing scales. The paired Student's *t*-test was utilized for statistical analysis with an alpha error of 5% considered acceptable (P value < 0.05).

Results

There was a significant difference between the volumetric measurements before and after exercising using the four selected apparatuses over the time and at an intensity determined by this study, the two-tailed P value is 0.0032, with a mean loss of 57.32 g (Tables 1 and 2).

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Discussion

The present study demonstrated that contention using a sleeve made of a cotton–polyester material associated with exercise reduces the size of the limb when performed using the established parameters. There are no international publications evaluating apparatuses that assist exercise when associated with a contention mechanism in the treatment of lymphedema. Moreover, there are few studies establishing

Table 1 Volume of the lymphedematous limb before and after performing exercises using the apparatuses and Godoy & Godoy contention (cotton–polyester sleeve)

Patients (n)	Before volume (g)	Final volume (g)
1	1,920	2,050
2	2,671	2,573
3	1,869	1,738
4	2,973	3,037
5	1,692	1,630
6	1,703	1,680
7	1,910	1,908
8	2,069	1,872
9	1,492	1,467
10	2,343	2,420
11	2,457	2,587
12	2,218	2,168
13	1,792	1,583
14	1,663	1,582
15	1,892	1,895
16	1,443	1,336
17	1,483	1,462
18	2,038	1,961
19	1,363	1,260
20	1,826	1,785
21	2,465	2,326
22	2,213	2,181
23	1,325	1,315
24	2,235	2,034
25	1,678	1,543
26	1,341	1,264
27	1,796	1,823
28	1,654	1,439

criteria for exercising in the treatment of lymphedema, chiefly in respect to the lower limbs. Even so, exercising constitutes one of the cornerstones in the treatment of lymphedema as recommended in the literature.

The study developed apparatuses from studies of the working pressure exerted by the main muscle groups, associated to a contention mechanism. An attempt was made to develop simple low-cost products which fill the established objectives; to create working pressures with low energy expenditure. The time of each exercise was evaluated in

Table 2 Mean and standard deviation of volume before and after 60 minutes with apparatus exercise

	Initial (vol)	After 60 minutes	Difference	P < 0.003
N	28	28		
Mean	1,911.6	1,854.3	57.321	
Standard deviation	416.55	445.92	93.732	
Standard error	78.720	84.271	17.714	
Median	1,847.5	1,804.0	56.000	

a pilot study on the tolerance of patients and from this information an evaluation method was established. Some aspects are of fundamental importance when performing exercises such as the velocity and thus patients should be supervised. Higher velocities may increase the volume, instead of reducing it. These findings were obtained with experience acquired in the treatment and from continuous assessment of patients, that is, after each type of activity, water displacement volumetry was performed. It is important to remember that patients try to increase the velocity of the exercises over the treatment period in an attempt to accelerate the result.

Exercises are an important form of treatment when associated with a contention mechanism, however patients must be supervised and frequently assessed, because the edema may increase if the exercises are incorrectly performed. In respect to a contention mechanism during active exercising, it seems to be fundamental, but even so, it can act as a tourniquet and continuous care is required. Another aspect identified in the evaluation of the different forms of exercise for these patients, either when using apparatuses or not, is the necessity of personal adaptation, with professionals suggesting volumetric evaluations for each patient and each programmed activity to identify which activities are best adapted to individuals. This adaptation involves performing exercises in the clinic to their adaptation in the patient's home.

Conclusion

Association of a Godoy & Godoy contention during apparatus-assisted exercise reduced the edema in patients with lymphedema of the upper limbs.

Disclosure

The authors report no conflicts of interest in this work.

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