Efficacy of Manual Lymphatic Drainage Techniques in Management of Patients with Post Mastectomy Lymphedema

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ABSTRACT

Background: *Lymphedema is a progressive chronic condition that affects a significant number of people and can have deleterious effects on patients' physical and psychosocial health. Several recent systematic reviews have highlighted the distinct lack of evidence for the optimal management of Lymphedema.* ***Purpose:*** *to compare the efficacy of Casley-Smith Vodder versus techniques in terms of circumferential and volumetric measurements in patients with post mastectomy unilateral upper extremity Lymphedema.* ***Methods:*** *30 female post mastectomy patients were assigned randomly to two treatment groups. Group A; 15 patients with unilateral upper extremity Lymphedema received Vodder Technique six days per week for three consecutive weeks. Each session was 30 minutes. Group B; 15 patients with unilateral upper extremity Lymphedema received Casley-Smith technique six days per week for three consecutive weeks. Each session was 45 minutes.* ***Results:*** *the findings of this study demonstrated that Casley-Smith group showed a statistically significant (P< 0.05) reduction in circumferential and volumetric measurement during and post-treatment, than that of the Vodder group.* ***Conclusion:*** *The findings of the current study proved that casley-smith technique showed greater improvement and reduction in the upper extremity swelling volume than Vodder technique.*

Key words: *Lymphedema, Manual Lymphedema Drainage, Post mastectomy.*

INTRODUCTION

Lymphedema is the result of accumulation of fluid and other elements in the tissue spaces due to an imbalance between interstitial fluid production and transport. In patients with chronic Lymphedema, large amounts of subcutaneous adipose tissue may form. Although incompletely understood, this adipocyte proliferation may explain why conservative treatment may not completely reduce the swelling and return the affected area to its usual dimensions[6].

Lymphedema may produce significant physical and psychological morbidity. Increased limb size can interfere with mobility and affect body image[3,23]. In developed countries, the main cause of lymphoedema is widely assumed to be treatment for cancer. Indeed, prevalences of 12-60% have been reported in breast cancer patients and of 28-47% in patients treated for gynecological cancer[12,13,16]. Lymphedema is a condition that develops slowly and once present is usually progressive. Lymphedema after breast cancer has been studied the most, but lymphedema can occur as a result of other cancers, including melanoma, gynecologic cancer, head and neck cancer and sarcoma.

Measures of limb volume have been the standard way of detecting lymphedema for years and have been shown to be accurate when properly done. Volume is measured by 3 main methods: tape measurements, perometry, and water displacement[1,2,21].

Complete Decongestive Therapy (CDT) consists of an initial reductive phase (Phase I) followed by a maintenance phase (Phase II). In Phase I, the main goals are reducing the size of the affected part and improving the skin. After Phase I, the person with lymphedema needs to continue into Phase II, an ongoing, individualized self- management phase to make sure the gains of Phase I are maintained long term[7].

Manual Lymph Drainage (MLD) is an essential part of CDT. It is a specialized hands-on technique that appears to work by two mechanisms. It stimulates superficial lymphatic vessels to remove excess interstitial fluid and it moves it through subepidermal fluid channels that form when lymphatics are damaged. MLD is a light, skin technique learned by certified lymphedema therapists designed to improve fluid removal from congested areas where the lymphatics are not working properly and into lymph vessels and

lymph nodes that are functioning[10,22]. CDT has been shown to be effective in large numbers of case studies demonstrating limb volume reductions of 50-70% or more, improved appearance of the limb, reduced symptoms, improved quality of life, and fewer infections after treatment. All interventions for lymphedema must have the goals of inducing and maintaining volume reduction, preventing medical complications, improving skin condition, reducing infection, enhancing patient adherence, and improving comfort and quality of life[14].

Effects of CDT are to: decrease swelling, increase lymph drainage from the congested areas, reduce skin fibrosis and improve the skin condition. enhance patient's functional status. relieve discomfort and improve quality of life,. reduce the risk of cellulitis and Stewart-Treves-Syndrome, a rare form of angiosarcoma[4]. Optimally, CDT is performed daily (5 days/week) until the reduction of fluid volume has reached a plateau, which can take 3 to 8 weeks[25].

SUBJECTS, MATERIALS AND METHODS

Subjects

Criteria for inclusion in the study were restricted to Thirty female post mastectomy subjects with age range 30-70 years were randomly selected from the Breast Cancer Association (BCA) that were referred by an oncologist physician for lymphedema treatment. All subjects had unilateral mastectomy & consequently unilateral lymphedema in the upper extremity. In case of radiation therapy, a minimum of 3 month relapse was given before commencing lymphedema treatment. Instrumentation included tape measurement & volumetric water displacement method. Study Design. A randomized controlled clinical trial, repeated measures design with two treatment groups (Casley- Smith and Vodder. Group A; fifteen subjects with unilateral upper extremity lymphedema received Vodder Technique 6 days per week for 3 consecutive weeks. Each session was 30 minutes long. Group B; fifteen subjects with unilateral upper extremity lymphedema received Casley-Smith technique 6 days per week for 3 consecutive weeks. Each session was 45 minutes long. Repeated data collection method was used; were data was collected at the first visit, weekly, then after the last session. Both treatment procedures were administered by the same certified lymphedema therapist. All subjects signed a consent form prior to the administration of the treatment procedure.

The main technique used in this study consisted of Treatment of Lymphedema was CDT which is a primary tool in lymphedema management consisting of MLD, short stretch compression bandaging, therapeutic exercise, and skin care[20]. MLD consists of gentle rhythmic manual manipulationintended to encourage the natural circulation of the lymph flow through lymphatic ductsusing a specific amount of pressure (less than 9 ounces per square inch) directed to the neck, trunk, and involved extremity (in that order), lasting approximately 30 to 60 minutes[19].

RESULTS

I) Swelling Volume (circumferential measurement):

1- Within subjects: For Group (A) there was a significant difference of swelling volume (circumferential measurement) values between pre-treatment value and during treatment value as t-value was (22.94) and P-value was ($P<0.001$), there was significant difference of swelling volume (circumferential measurement) values between pre-treatment value and post-treatment value as t-value was (30.21) and P-value was ($P<0.001$), and finally there was a significant difference of swelling volume (circumferential measurement) values between during treatment value and post-treatment value as t-value was (7.27) and P-value was ($P<0.001$) as shown in table (1). For group (B) there was a significant difference of swelling volume (circumferential measurement) values between pre-treatment value and during treatment value as t-value was (9.06) and P-value was ($P<0.001$), there was significant difference of swelling volume (circumferential measurement) values between pre-treatment value and post-treatment value as t-value was (14.78) and P-value was ($P<0.001$), and finally there was a significant

difference of swelling volume (circumferential measurement) values between during treatment value and post-treatment value as t-value was (5.72) and P-value was (P<0.001) as shown in table (1).

Table (1): Post hoc test of the Swelling Volume (circumferential measurement) Pre treatment, during treatment, and Post treatment for group (A&B).

	Comparison	Mean Difference	t-value	P-value	S
Group (A)	Pre treatment vs. during treatment	697.15	22.94	P<0.001	S
	Pre treatment vs. Post treatment	918.07	30.21	P<0.001	S
	During treatment vs. Post treatment	220.92	7.27	P<0.001	S
Group (B)	Pre treatment vs. during treatment	248.6	9.06	P<0.001	S
	Pre treatment vs. Post treatment	405.61	14.78	P<0.001	S
	During treatment vs. Post treatment	157.01	5.72	P<0.001	S

P-value = Probability S = Significance

2- Between groups: The independent t-test revealed that there was no significant difference between both groups in swelling volume (circumferential measurement) at pre-treatment values where the t-value was (0.17) and P-value was (0.86). However, there was a significant difference between both groups in swelling volume (circumferential measurement) at during treatment values where the t-value was (2.2) and P-value was (0.03), and finally there was a significant difference between both groups in swelling volume (circumferential measurement) at post treatment values where the t-value was (2.48) and P-value was (0.01) as shown in table (2).

Table (2): Independent t-test for Swelling Volume (circumferential measurement) at pre, During, and Post treatment between Groups (A,B).

Swelling Volume (circumferential measurement)	Pre Treatment	During Treatment	Post Treatment
Mean difference	38.34	486.9	550.8
t-value	0.17	2.2	2.48
P	0.86	0.03	0.01
S	NS	S	S

P-value = Probability S = Significance NS = Non significance

II) Swelling Volume (volumetric measurement)

1- Within subjects: For Group (A) there was a significant difference of swelling volume (volumetric measurement) values between pre-treatment value and during treatment value as t-value was (17.3) and P-value was (P<0.001), there was significant difference of swelling volume (volumetric measurement) values between pre-treatment value and post-treatment value as t-value was (22.86) and P-value was (P<0.001), and finally there was a significant difference of swelling volume (volumetric measurement) values between during treatment value and post treatment value as t-value was (5.56) and P-value was (P<0.001)as shown in table (3).

For group (B) there was a significant difference of swelling volume (volumetric measurement) values between pre-treatment value and during treatment value as t-value was (6.85) and p-value was (P<0.001), there was significant difference of swelling volume (volumetric measurement) values between pre-treatment value and post-treatment value as t-value was (12.52) and p-value was (P<0.001), and finally there was a significant difference of swelling volume (volumetric measurement) values between during treatment value and post treatment value as t-value was (5.67) and P-value was(P<0.001)as shown in table (3).

Table (3): Post hoc test of the swelling volume (volumetric measurement) pre treatment, during treatment, and post treatment for Group (B).

GROUP	Comparison	Mean Difference	t-value	P-value	S
(A)	Pre treatment vs. during treatment	641.6	17.3	P<0.001	S
	Pre treatment vs. Post treatment	847.9	22.86	P<0.001	S
	During treatment vs. Post treatment	206.3	5.56	P<0.001	S
(B)	Pre treatment vs. during treatment	242.8	6.85	P<0.001	S
	Pre treatment vs. Post treatment	443.68	12.52	P<0.001	S
	During treatment vs. Post treatment	200.87	5.67	P<0.001	S

P-value = Probability S = Significance

2- Between groups: The independent t-test was performed to determine the difference in swelling volume (volumetric measurement) at pre and during treatment, and post treatment between Groups (A,B). There was no significant difference between both groups in swelling volume (volumetric measurement) at pre-treatment values where the t-value was (0.23) and p-value was (0.81). While there was a significant difference between both groups in swelling volume (volumetric measurement) at during treatment values where the t-value was (2.2) and p-value was (0.03), and finally there was a significant difference between both groups in swelling volume (volumetric measurement) at post treatment values where the t-value was (2.24) and p-value was (0.03) as shown in table (3).

Table (4): Independent t-test for Swelling Volume (volumetric measurement) at pre, During, and Post treatment between Groups (A,B).

Swelling Volume (volumetric measurement)	Pre Treatment	During Treatment	Post Treatment
Mean difference	41.06	357.73	363.13
t-value	0.23	2.2	2.24
P-value	0.81	0.03	0.03
S	NS	S	S

DISCUSSION

The results showed that both; Vodder and casley-smith MLD techniques resulted in a significant decrease in circumferential and volumetric measurement during and post-treatment to (3662.8 ±541.66), (3441.88 ±511.26), (4149.7 ±660.1), (3992.69 ±688.75) respectively. These findings were supported by a cohort study conducted by Harris et al., 2001[5], Williams et al. 2002[22]. In addition to a study conducted by Ko et al. (1998)[9], were they found a complex therapy combining MLD, bandaging/compression techniques which is done immediately after MLD, meticulous skin and nail care resulted in great reduction of swelling volume in patients with lymphedema. However, in a systematic review conducted by Mosely et al. (2007)[15], they found that complex physical therapy, manual lymphatic drainage, pneumatic pump and laser therapy generally yielded the greater volume reductions than self-initiated therapies such as compression garment wear, exercise and limb elevation. MLD has been shown to be effective in lymphedema management, where it has a number of physiological effects, which includes an increase in the contraction rate of lymphatics[9], reduced microlymphatic hypertension and improved collateral lymph drainage between the lymphatic territories of the skin. Improved drainage enables fluid to be redirected away from edematous areas towards the functioning lymph nodes in unaffected areas, an important principle in lymphedema management.

Since the initial lymphatics in particular are very fragile, where this superficial network lies just below the skin surface, hence, very light pressure will move lymph through these vessels. In addition to the slow work across the watersheds and the continual re-clearing of the more proximal areas of the trunk, opens new drainage pathways across the watershed through the enlargement of the superficial lymphatic drainage paths and the increase of the drainage of the adjacent normal lymphotome through its normal lymphatic

system. To do this, half of the deep collaterals crossing the watershed must have their normal direction of flow reversed despite the direction of their valves, and this involves much slow work. The pressure of the "stroke" may be increased slightly as the hand passes over a watershed[15]. Another possible mechanism behind the effectiveness of the Casley-Smith method that pioneered over the Vodder was that the Vodder's techniques are directed toward making essentially normal lymphatics work better (to reduce the edemas of trauma). They were not designed originally to reduce lymphedema caused by damaged or nonexistent lymphatics; they did not transfer the lymph to other, still normally drained regions to the extent that Casley-Smith method does[8]. Also, it is possible that in the early part of the Casley-Smith method, concentrates on clearing the adjacent normal regions, increasing pumping by and enlarging the existing collaterals, and softening fibrous tissue, thus reducing the limb. The latter part concentrates on increasing collateral drainage and a greater time is spent on the limb, yielding further reductions. These various massage techniques work over the watershed areas and is more intensive and concentrated. The time spent on Casley-Smith MLD on a consecutive daily basis can range from 40 minutes to 90 minutes or longer per limb involved. If only 40 minutes are available, then at least 30 of these minutes are spent clearing the trunk and the lymphotomes adjacent to the affected limb in the initial stages. This produces a much better result than spending more time on the limb itself[17].

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الملخص العربي

تأثير تقنيات العلاج اليدوي الليمفاوي في التحكم على تورم الطرف العلوي الليمفاوي بعد استئصال سرطان الثدي

مقدمة : ينتشر التورم الليمفاوي بين السيدات بعد استئصال سرطان الثدي بنسبة كبيرة مما يؤدي إلى التأثير على وظائف الطرف العلوي.تتعدد وسائل العلاج الطبيعي المستخدمة في علاج هذا التورم إلا أنه بدأ التركيز في الأونة الأخيرة على استخدام العلاج اليدوي في صورة كل من تقنية "كاسلي سميث" و"فودر" للتحكم والسيطرة على هذا النوع من التورم . الهدف : تهدف هذه الدراسة إلى تقييم فاعلية كل من تقنية "كاسلي سميث" و"فودر" للتحكم والسيطرة على هذا النوع من التورم . الطريقة : تم إجراء هذا البحث على ٣٠ مريضا (نساء) تتراوح أعمارهم بين٣٠ – ٧٠عام ويعانون من تورم ما بعد استئصال سرطان الثدي. تم تقسيم المرضى عشوئيا إلى مجموعتين متساويتين في العدد حيث تم علاج المجموعة الأولى بواسطة تقنية "كاسلي سميث" والثانية بطريقة "فودر" لمدة ٣ أسابيع لمدة ١٨ جلسة . النتائج : أظهرت النتائج فروق ذات دلالة معنوية إحصائية في كلتا المجموعتين بين المتغيرات موضع الدراسة وهي حجم الذراع قبل وبعد العلاج إلا أنها أوضحت أيضا أنه هناك فروق ذات دلالة معنوية إحصائية بين كل من تقنية "كاسلي سميث" و"فودر" للتحكم والسيطرة على هذا النوع من التورم ، في جانب تقنية كاسلي سميث . الخلاصة : التقنيات العلاجية اليدوية تقنية "كاسلي سميث" لها تأثير يفوق تقنية "فودر" في التحكم والسيطرة على التورم الليمفاوي .

الكلمات الدالة : تقنية "كاسلي سميث" – تقنية "فودر" – التورم الليمفاوي .