



Case Study

The effects of bandaging with an additional pad and taping on secondary arm lymphedema in a patient after mastectomy

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Abstract. [Purpose] The purpose of this case study was to determine the effectiveness of bandaging the arm of a patient with secondary lymphedema on the patient's quality of life, arm volume and arm function using an additional pad and taping along with some other standard therapy modalities for lymphedema. [Subjects and Methods] I used a bandage with an additional pad and taping, along with MLD, exercise, and skin care to treat a patient with unilateral breast-cancer-related arm lymphedema who had fibrotic tissue on her lower arm and hand. I made a pad called a "muff" and applied it under tape while using Vodder's technique. Treatment was performed during 5 therapy sessions a week for 2 weeks. [Results] After the physiotherapy sessions, the excess edema volume decreased to 608 ml, and the percentage of excess volume (PEV) was 9.6%. The therapeutic efficacy, measured as percentage reduction of excess volume (PREV), was -79.5%, meaning that the edema volume was reduced 79.5%. The use of an additional pad and taping on a large edematous site with fibrotic changes can produce more efficacious lymphedema care. [Conclusion] The use of an additional pad and taping on a large edematous site with fibrotic changes has demonstrated a positive result in lymphedema management for a post mastectomy patient and, therefore, further studies on this method are suggested with a larger sample size.

Key words: Breast neoplasms, Lymphedema, Quality of life

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INTRODUCTION

Upper-extremity lymphedema after breast cancer surgery is one of the most disruptive symptoms to a patient's daily life¹⁾. Lymphedema is defined as the abnormal accumulation of protein-rich fluid in extracellular spaces, caused by decreased lymphatic transport capacity and an increased lymphatic load²⁾. Upper-extremity lymphedema after a mastectomy is the most complained-about symptom of breast cancer treatment. Both surgery and radiotherapy, involving lymph drainage routes of the breast and axillary areas, are causes of the development of lymphedema³⁾. Lymphedema can appear as swelling of the arm, hand, trunk, or breast. It can lead to pain and a sensation of heaviness in the affected area. These symptoms can affect physical functions and also cause psychological distress⁴⁾. Consequently, it decreases the patient's quality of life.

Currently, the standard care for lymphedema consists of complex decongestive physiotherapy (CDP), which includes manual lymphatic drainage (MLD), bandaging, therapeutic exercise, skin care, and offering precautions about daily activities⁵⁾. Several studies have reported that physical therapy reduces the volume of the lymphedematous limb and improves the patient's quality of life^{6, 7)}. Sites that have additional fibrotic tissue require the application of greater pressure on the affected area than for edema alone. Therefore, pads made from short stretch bandages are commonly applied to the area first, then surrounded by multilayer inelastic lymphedema bandaging. This increases the resting pressure as well as the working pressure on the site, and also reducing the apparent volume of the arm.

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Clinically, we formed the pads from short-stretch bandages. However, only one study has been conducted regarding the effects of this type of pad, and it was the case of edema only of the hand⁸). Taping is a recent consideration for lymphedema. Kinesio tape (Kinesio Holding Company, Albuquerque, NM, USA) is elastic tape which can be stretched up to 120–140% of its original length, invented by Kenzo Kase in 1996. Kinesio tape can create space between the skin and muscle, which increases the lymph uptake⁹). Kinesio tape has been reported to be safe for patients with lymphedema, offering them improved function in their daily lives¹⁰).

We describe below a case regarding a patient with unilateral arm lymphedema, for whom we used an additional pad and taping on the lower arm using short-stretch bandages. Ethical approval was received from Asan Medical Center (IRB number: 2015-796)

CASE REPORT

A 69-year-old female with a medical history of right breast cancer had been diagnosed in 2010. She had had a radical mastectomy modified with axillary lymph node dissection and wide excision. She had received regular chemotherapy 8 times and undergone radiation therapy. She reported that she hadn't had lymphedema after surgery. She developed lymphedema 3 months ago before her recent visit to the hospital. She said that she had peeled garlic for 7 consecutive hours 1 week before the lymphedema appeared. She visited our clinic due to the progressive swelling and fibrosis of her right arm that had by then lasted for months was disrupting her daily activities.

Upon physical examination, stage II lymphedema and fibrosis of the right forearm was found (Fig. 1). A complete laboratory work-up and imaging studies were unremarkable for infection or venous obstruction of the right arm. The results of lymphoscintigraphy showed that her right axillary lymph node uptake was not observed and diffuse increased uptake by dermal backflow had appeared. I arranged 5 therapy sessions a week for her for 2 weeks. In every therapy session over a total of 10 sessions, 30 minutes of MLD was performed by one physical therapist certified in the Vodder's technique which is known as lymphatic massage technique. The same therapist made a short-stretch bandage pad and applied it to the patient. The pad was made by the physical therapist. According to the Vodder School, this pad is called a "muff." A stockinette was cut into a 1 × 1 cm square piece of Rosidal soft bandage placed inside it, then the stockinette's edges were stitched together. The pad was put on the patient's lower arm and dorsum before another Rosidal soft bandage was applied. Kinesio tape was applied to the hand, arm, and trunk. The Kinesio tape used was designed to make a 30–40% longitudinal stretch. The patient did 20 therapeutic exercises to facilitate venous and lymphatic flow, and received instructions for skin and nail care. Exercises included an active range of motion of upper extremity and deep breathing exercise. The short stretch bandage was kept on for 23 hours and replaced at the next day.

Circumferential measurements were taken at every 4 cm from the wrist to the axilla, and at the dorsum to below 4 cm from the wrist, using the formula $\sum \text{Circumference}^2 / \pi^3$. The measurements were made before the beginning of the treatment and after 2 weeks of treatment¹¹). The severity of the lymphedema was defined as the percentage of excess volume (PEV) or the excess lymphedema volume relative to the healthy arm: $\text{PEV} = ((\text{volume of lymphedema arm} - \text{volume of healthy arm}) / (\text{volume of healthy arm})) \times 100\%$. The response to the therapeutic intervention was quantified as the percentage reduction of excess volume (PREV): $\text{PREV} = 100\% \times (\text{posttreatment volume of lymphedema arm} - \text{baseline volume of lymphedema arm}) / \text{excess volume}$.



Fig. 1. Status of a lymphedema before treatment



Fig. 2. Status of a lymphedema on dorsum after treatment

Table 1. Volume reduction

Variable	Baseline	Post-10-Time Treatment
Excess volume (EV)	764 ml	
Post-t/x decreased EV, ml		-608 ml
PEV, %	47.1%	9.6%
PREV, %		-79.5%

PEV: percentage of excess volume; PREV: percentage reduction of excess volume

Table 2. QOL and arm function

	Baseline	Post-10-Time Treatment
EORTC QLQ-C30*		
Global health status/QOL	50	100
DASH	47.5	15

*Quality of life questionnaire-cancer. DASH: disabilities of the arm, shoulder and hand

The initial excess volume was 764 ml, and the lymphedema severity-baseline PEV was 47.1%, which indicated severe lymphedema, based on the definition from the International Society of Lymphology. After the 10 physiotherapy sessions, the excess volume decreased by 608 ml, and PEV was 9.6%. The therapeutic efficacy, PREV, was -79.5%, meaning that the edema volume could be reduced by 79.5% after 10 sessions of therapy (Table 1) (Fig. 2).

The patient followed the entire course of treatment well. After 2 weeks, the score for her quality of life (QOL) question in the EORTC QLQ-C30 questionnaire improved to 100, compared to a baseline score of 50 baseline. Also, the score for her disabilities of the arm, shoulder and hand (DASH) also improved (Table 2).

DISCUSSION

This patient's PEV improved from 47.1 to 9.6% after therapy, from severe lymphedema to minimal lymphedema. The lymphedema reduction was 79.5% after 10 sessions of therapy; therefore the lymphedema treatment was successful, as per Ramos's definition. According to Ramos, S. M. et al., the definition of successful lymphedema treatment is a mean reduction of 50% or more of pre-treatment edema fluid volume¹²). In this case, the result was as good as those in previous studies, which have demonstrated that the CDP program can reduce fluid volume^{13, 14}). I wished to determine if the additional pad contributed further to the positive results of this treatment.

The role of MLD by itself as a treatment method for lymphedema is still controversial in breast cancer related lymphedema (BCRL) studies. Bergmann, A. et al. reported that MLD did not significantly increase the therapeutic response in women with lymphedema after breast cancer¹⁵). McNeely et al. showed MLD only had an effect on mild early-stage lymphedema¹⁶). Based on the results of the meta-analysis, Huang, T. W. did not recommend the addition of MLD to compression therapy for patients with breast-cancer-related lymphedema¹⁷). Though he/she demonstrated that exercises improve mobility and muscular activity and lead to the internal compression of lymph vessels, and that intermittent pressure changes between muscles and external compression (bandages or compressive garments) stimulate lymph drainage, Korpan et al. who studied the effects of exercise on lymphedema, concluded that further research is needed¹⁸).

A specific application of additional pads combined with Kinesio tape may assist improve the effect of conventional lymphedema management using the MLD and/or the CDP. As this study suggested the effect of the standard CDP may be enhanced when it follows the Vodder's school method and combined with Kinesio tape. The strongest contributor for the enhancement was probably the specific application method of the compression pads. Compression therapy using a multilayer bandage acts by modifying the capillary dynamics of veins, lymph vessels and tissues. It promotes increased interstitial pressure and increased ability of muscle and joint pumping. Foldi said that CDP would not be successful if the patients were not able to cooperate with the compression therapy¹⁹). The compression therapy on its own should be considered as a part of the treatment option in reducing arm lymphedema volume, while additional taping should be considered for further decreasing the fluid volume.

Many researchers have discussed the various physiological symptoms of lymphedema. One study measured 11 lymphedema-related symptoms, such as sensations of pain, discomfort, heaviness, fullness, bursting, hardness, heat, cold, numbness, weakness, and tingling to evaluate the effects of intervention²). The patient in this case also felt discomfort, heaviness, fullness, and hardness. The impact of lymphedema on QOL ranges from subtle to drastic, and sequelae include frustration, distress, depression, and anxiety, particularly with regard to body image²⁰). Therefore, this patient's quality of life (QOL) was affected both physically and psychologically. After her lymphedema status improved, her DASH score also improved compared to her baseline evaluation. Therefore the improvement of her symptoms most likely positively affected her quality of life.

The use of an additional pad and taping underneath a compression bandage had an excellent effect on this case of second-arm lymphedema. A large-sample study may further clarify this case study's findings.

REFERENCES

- 1) International Society of Lymphology: The diagnosis and treatment of peripheral lymphedema. 2009 Consensus Document of the International Society of Lymphology. *Lymphology*, 2009, 42: 51–60. [[Medline](#)]
- 2) Williams AF, Vadgama A, Franks PJ, et al.: A randomized controlled crossover study of manual lymphatic drainage therapy in women with breast cancer-related lymphoedema. *Eur J Cancer Care (Engl)*, 2002, 11: 254–261. [[Medline](#)] [[CrossRef](#)]
- 3) Woods M, Tobin M, Mortimer P: The psychosocial morbidity of breast cancer patients with lymphoedema. *Cancer Nurs*, 1995, 18: 467–471. [[Medline](#)] [[Cross-Ref](#)]
- 4) Forner-Cordero I, Muñoz-Langa J, Forner-Cordero A, et al.: Predictive factors of response to decongestive therapy in patients with breast-cancer-related lymphedema. *Ann Surg Oncol*, 2010, 17: 744–751. [[Medline](#)] [[CrossRef](#)]
- 5) Koul R, Dufan T, Russell C, et al.: Efficacy of complete decongestive therapy and manual lymphatic drainage on treatment-related lymphedema in breast cancer. *Int J Radiat Oncol Biol Phys*, 2007, 67: 841–846. [[Medline](#)] [[CrossRef](#)]
- 6) Pinell XA, Kirkpatrick SH, Hawkins K, et al.: Manipulative therapy of secondary lymphedema in the presence of locoregional tumors. *Cancer*, 2008, 112: 950–954. [[Medline](#)] [[CrossRef](#)]
- 7) Cho Y, Do J, Jung S, et al.: Effects of a physical therapy program combined with manual lymphatic drainage on shoulder function, quality of life, lymphedema incidence, and pain in breast cancer patients with axillary web syndrome following axillary dissection. *Support Care Cancer*, 2016, 24: 2047–2057. [[Medline](#)] [[CrossRef](#)]
- 8) Kang Y, Jang DH, Jeon JY, et al.: Pressure monitoring of multilayer inelastic bandaging and the effect of padding in breast cancer-related lymphedema patients. *Am J Phys Med Rehabil*, 2012, 91: 768–773. [[Medline](#)] [[CrossRef](#)]
- 9) Tsai HJ, Hung HC, Yang JL, et al.: Could Kinesio tape replace the bandage in decongestive lymphatic therapy for breast-cancer-related lymphedema? A pilot study. *Support Care Cancer*, 2009, 17: 1353–1360. [[Medline](#)] [[CrossRef](#)]
- 10) Martins JC, Aguiar SS, Fabro EA, et al.: Safety and tolerability of Kinesio Taping in patients with arm lymphedema: medical device clinical study. *Support Care Cancer*, 2016, 24: 1119–1124. [[Medline](#)] [[CrossRef](#)]
- 11) Taylor R, Jayasinghe UW, Koelmeyer L, et al.: Reliability and validity of arm volume measurements for assessment of lymphedema. *Phys Ther*, 2006, 86: 205–214. [[Medline](#)]
- 12) Ramos SM, O'Donnell LS, Knight G: Edema volume, not timing, is the key to success in lymphedema treatment. *Am J Surg*, 1999, 178: 311–315. [[Medline](#)] [[CrossRef](#)]
- 13) Szuba A, Achalu R, Rockson SG: Decongestive lymphatic therapy for patients with breast carcinoma-associated lymphedema. A randomized, prospective study of a role for adjunctive intermittent pneumatic compression. *Cancer*, 2002, 95: 2260–2267. [[Medline](#)] [[CrossRef](#)]
- 14) Liao SF, Huang MS, Li SH, et al.: Complex decongestive physiotherapy for patients with chronic cancer-associated lymphedema. *J Formos Med Assoc*, 2004, 103: 344–348. [[Medline](#)]
- 15) Bernas MJ, Witte CL, Witte MH, International Society of Lymphology Executive Committee: The diagnosis and treatment of peripheral lymphedema: draft revision of the 1995 consensus document of the International Society of Lymphology Executive Committee for discussion at the September 3–7, 2001, XVIII International Congress of Lymphology in Genoa, Italy. *Lymphology*, 2001, 34: 84–91. [[Medline](#)]
- 16) McNeely ML, Magee DJ, Lees AW, et al.: The addition of manual lymph drainage to compression therapy for breast cancer related lymphedema: a randomized controlled trial. *Breast Cancer Res Treat*, 2004, 86: 95–106. [[Medline](#)] [[CrossRef](#)]
- 17) Huang TW, Tseng SH, Lin CC, et al.: Effects of manual lymphatic drainage on breast cancer-related lymphedema: a systematic review and meta-analysis of randomized controlled trials. *World J Surg Oncol*, 2013, 11: 15. [[Medline](#)] [[CrossRef](#)]
- 18) Korpan MI, Crevenna R, Fialka-Moser V: Lymphedema: a therapeutic approach in the treatment and rehabilitation of cancer patients. *Am J Phys Med Rehabil*, 2011, 90: S69–S75. [[Medline](#)] [[CrossRef](#)]
- 19) Chou YH, Li SH, Liao SF, et al.: Case report: manual lymphatic drainage and kinesio taping in the secondary malignant breast cancer-related lymphedema in an arm with arteriovenous (A-V) fistula for hemodialysis. *Am J Hosp Palliat Care*, 2013, 30: 503–506. [[Medline](#)] [[CrossRef](#)]
- 20) McWayne J, Heiney SP: Psychologic and social sequelae of secondary lymphedema: a review. *Cancer*, 2005, 104: 457–466. [[Medline](#)] [[CrossRef](#)]