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What is This?

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Abstract
Lymphedema is a dreaded complication of breast cancer treatment. The standard care for lymphedema is complex decongestive physiotherapy, which includes manual lymphatic drainage (MLD), short stretch bandaging, exercise, and skin care. The Kinesio Taping could help to improve lymphatic uptake. We reported a patient with unilateral secondary malignant breast cancer-related lymphedema and arteriovenous (A-V) fistula for hemodialysis happened in the same arm, and used kinesio taping, MLD, and exercise to treat this patient because no pressure could be applied to the A-V fistula. The 12-session therapy created an excellent effect. We do not think the kinesio taping could replace short stretch bandaging, but it could be another choice for contraindicating pressure therapy patients, and we should pay attention to wounds induced by kinesio tape.

Keywords
breast cancer-related lymphedema, arterio-venous fistula, kinesio tape, compression therapy, complex decongestive therapy, manual lymphatic drainage

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Case Report

A 48-year-old female with a medical history of end-stage renal disease treated with 3 hemodialysis sessions every week since 1999 using an A-V fistula in the left elbow and also left breast cancer (stage T3N1M1) diagnosed in 2007. She refused surgery and had received regular chemotherapy since 2007. She underwent radiation therapy (3500 cGy) from the 6th cervical spine to the 3rd thoracic spine for bony metastasis in September 2009. She visited our clinic on September 29, 2011, due to progressive swelling and fibrosis of the left arm lasting for months that disturbed her activities of daily living. She was undergoing weekly chemotherapy with paclitaxel (60 mg/m²) due to liver and lung metastasis at that time. On physical examination, stage II lymphedema and fibrosis of the left forearm and arm was found (Figure 1). A complete laboratory work-up and imaging studies were unremarkable for infection or venous obstruction of the left arm. The volume of each limb was calculated from the circumference using the truncated cone formula.13 The severity of lymphedema was defined as the percentage of excess volume (PEV) or the excess lymphedema volume relative to the healthy arm ($V_H$), $PEV = \frac{(V_L - V_H)}{V_H} \times 100\%$. The response to the therapeutic intervention was quantified as the percentage reduction of excess volume (PREV), $PREV = 100\% \times (posttreatment V_L - baseline V_L)/excess volume$.

The initial circumference difference was 37.6 cm, excess volume was 992 mL, and the lymphedema severity—baseline PEV was 79.15\%, which was severe lymphedema based on the definition of International Society of Lymphology.14 After the 12 therapy sessions, the circumference was reduced 19.8 cm, excess volume decreased 536 mL, and PEV was 36.43\%. The therapeutic efficacy, PREV, was $-54\%$, meaning that the edema volume could be reduced 54\% in 12 sessions of therapy (Table 1).

The patient continued with a further 4 sessions of therapy but the PEV and PREV did not show a reduction after the extra sessions. She tolerated the entire treatment course well, except the pruritus and wound production in the kinesio taping area. She refused continuation of the kinesio taping because of the skin lesions induced by the kinesio tape and felt more comfortable after therapy.

![Figure 1. Left arm lymphedema after 3 sessions of therapy.](image1)

![Figure 2. Kinesio taping rerouting lymph flow from the left arm through the back watershed to the right axillary area.](image2)
Table 1. Lymphedema Characteristics.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Baseline</th>
<th>Post-6-Time Treatment</th>
<th>Post-12-Time Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excess circumference, cm</td>
<td>37.6</td>
<td>24.8</td>
<td>17.8</td>
</tr>
<tr>
<td>Post-t/(\times) decreased circumference, cm</td>
<td></td>
<td>-12.8</td>
<td>-19.8</td>
</tr>
<tr>
<td>Excess volume (EV), mL</td>
<td>992</td>
<td>632</td>
<td>456</td>
</tr>
<tr>
<td>Post-t/(\times) decreased EV, mL</td>
<td></td>
<td>-360</td>
<td>-536</td>
</tr>
<tr>
<td>PEV, %</td>
<td>79.15</td>
<td>50.43</td>
<td>36.43%</td>
</tr>
<tr>
<td>PREV, %</td>
<td>-36.28</td>
<td>-36.28</td>
<td>-54.75%</td>
</tr>
</tbody>
</table>

Abbreviations: PEV, percentage of excess volume; PREV, percentage reduction of excess volume.

Discussion

This patient’s lymphedema was not a typical BCRL—it was caused by tumor infiltrating the left axillary lymph nodes. It is classified as a secondary malignant lymphedema. Soucek-Hadwiger et al\(^{15}\) reported that both tumor-specific therapy and an early start to complex physical oedematherapy are necessary to stabilize disease without symptoms of secondary malignant lymphedema.

This patient’s PEV improved from 79.15% to 36.43% after therapy or from severe lymphedema to moderate lymphedema.\(^{14}\) The lymphedema reduction was −54% after 12 sessions of therapy, so lymphedema treatment was successful using Ramos’s definition.\(^{8}\) We wanted to know which component played a major role in the therapy.

Many studies have shown that the CDP program can reduce PEV.\(^{1,5,7,8,16}\) The role of MLD is still controversial in BCRL studies. Williams et al\(^{17}\) reported MLD could further reduce PREV by 9.7% compared with simple lymphatic draining, but McNeely et al\(^{9}\) found an additional benefit to the application of MLD only in mild early-stage lymphedema. Didem et al compared CDP efficacy with standard physiotherapy (SP), SP group treated by bandage, head-neck and shoulder exercise, and skin care, and the efficacy of CDP group was 19.7% greater than SP group.\(^{18}\) But Anderson found MLD did not contribute significantly to the reduction of lymphedema volume when compared with compression sleeves and exercise.\(^{19}\) Based on previous studies, we could conclude that MLD worked well in early-stage lymphedema (duration <12 months)\(^{9}\) as this patient and that kinesio tape helped to reduce the greater edema volume, because MLD and remedial exercise alone did not have such a prominent effect. After the 12-session treatment, the efficacy reached a plateau and longer treatment did not further reduce the lymphedema volume. This also was the case with CDP, as most lymphedema reduction occurred during the first 10-session intensive treatment, and the fibrosis tissue did not resolve in a 12-session protocol.\(^{9,10,13,20}\) Kinesio tape did not work in fibrosis tissue but compression treatment with specific padding could improve fibrotic tissue in the CDP program.\(^{10,15}\)

Kinesio taping has been widely used with athletes due to its flexibility, comfort, and waterproof characteristic since it was developed in 1973.\(^{21-23}\) Dr Kase believed kinesio taping could improve lymphatic uptake and also help in the routing or rerouting of lymph in superficial lymphatic vessels.\(^{11}\) In the only one study to investigate the effect of kinesio taping in BCRL, Tsai et al\(^{12}\) concluded that kinesio tape could replace the bandage in CDP and could be an alternative choice for BCRL with poor bandage compliance after a 1-month intervention. This was an interesting study because both the CDP and kinesio taping groups showed there was no difference in volume and circumference when comparing the preintervention data with the 3-month follow-up results; both interventions showed subjective symptoms improvements only after the 3-month follow-up. The volume and circumference were significantly reduced after a 4-week intervention only in the bandaging group, although the patients wore the bandages for only 7.8 hours (it was supposed to be worn for 16 hours) in the daytime. In contrast, the kinesio taping group showed improved only forearm circumference and water composition after the intervention. In other words, Tsai study showed the intensive phase of the CDP program is still effective, even in patient with poor compliance. The effect of compression therapy is stronger than that of kinesio taping. Kinesio tape is not a substitute for bandaging, but it could be another choice if compression therapy is contraindicated.

Wounds production is a major problem with kinesio tape as Tsai\(^{12}\) noted, because the integrity of the skin is important in preventing infection in lymphedema care. This patient developed wounds and pruritus at the tapping area although the tape was carefully removed by the therapists. We think this was because of the adhesive characteristics of the kinesio tape, and that xerosis, pruritus, and fragile skin are common mucocutaneous disorders in patients with uremia.\(^{24}\) The putting on and taking off of kinesio tape in lymphedema therapy requires attention. In the future, the avoidance of wound production when using kinesio tape with lymphedema patients will be a major concern.

The use of MLD, kinesio taping, remedial exercise, and skin care had an excellent effect in this case of secondary malignant BCRL combined with an A-V fistula arm. We do not think that kinesio taping can replace short stretch bandaging, but it can be another choice for patients in which pressure therapy is contraindicated and in hospice care, and we need to pay attention to wounds induced by kinesio tape. The long-term effect and real role of kinesio taping in lymphedema need further evaluation.

Declaration of Conflicting Interests

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