Manipulative Therapy of Secondary Lymphedema in the Presence of Locoregional Tumors

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BACKGROUND. Complete decongestive therapy (CDT), including manual lymphatic drainage (MLD) is a manipulative intervention of documented benefit to patients with lymphedema (LE). Although the role of CDT for LE is well described, to the authors' knowledge there are no data regarding its efficacy for patients with LE due to tumor masses in the draining anatomic bed. Traditionally, LE therapists are wary of providing therapy to such patients with 'malignant' LE for fear of exacerbating the underlying cancer, and that the obstruction will render therapy less effective. In the current study, the authors' experience providing CDT for such patients is discussed.

METHODS. Cancer survivors with LE were referred to therapists at 2 Atlanta-area clinics. CDT consists of treatment (Phase 1) and maintenance phases (Phase 2). During Phase 1, the patient undergoes manipulative therapy and bandaging daily until the LE reduction plateaus; at that point, Phase 2 (self-care) begins. At the beginning and end of Phase 1, LE is quantified and differences in girth volume calculated. The results for patients completing Phase 1 therapy for LE in the presence of locoregional masses were compared with results for patients with LE in the absence of such disease. Both volume reduction of the affected limb and number of treatments to plateau were analyzed.

RESULTS. Between January 2004, and March 2007, LE of 82 limbs in 72 patients was treated with CDT and Phase 1 was completed. The median number of treatments to plateau was 12 (range, 4–23 treatments); the median limb volume reduction was 22% (range, −23 to 164%). Nineteen limbs (16 patients) with associated chest wall/axillary or pelvic/inguinal tumors had nonsignificant difference in LE reduction ($P = .75$) in the presence of significantly more sessions to attain plateau ($P = .0016$) compared with 63 limbs in 56 patients without such masses.

CONCLUSIONS. Patients with LE may obtain relief with CDT regardless of whether they have locoregional disease contributing to their symptoms. However, it will likely take longer to achieve that effect. Manipulative therapy of LE should not be withheld because of persistent or recurrent disease in the draining anatomic bed. *Cancer* **2008;112:950–4.** © *2007 American Cancer Society.*

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Patients treated for cancers of the breast and pelvis frequently develop lymphedema (LE) subsequent to damage sustained to the lymphatic drainage of the axilla and inguinal area. Surgical dissection to remove axillary or pelvic lymph nodes involved by cancer can injure the lymphatic tracts at the time of surgery, whereas radiation therapy (RT) can exacerbate lymphatic obstruction by resultant soft-tissue fibrosis. Lymphedema develops in 10% to 35% of breast cancer patients treated with axillary lymph node dissection, RT, or both.[1] Among patients treated for melanoma or other cancers of the pelvis by inguinal dissection, some degree of LE develops in 7% to

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46% of cases.[2] Due to impaired drainage, LE carries a significant risk of infection. It can also cause functional impairment, pain, and negative body image, all of which diminish patient quality of life.[3]

Complete decongestive therapy (CDT) is an effective intervention for reducing LE and is the standard of care recommended by the International Society of Lymphology.[4] There are 2 phases involved in CDT. The treatment phase (Phase 1) involves daily sessions of manual lymphatic drainage (MLD), a manipulative therapy performed by a certified therapist until maximal LE reduction is achieved. Phase 1 also involves compression bandaging, skin and nail care, and therapeutic exercise. Upon plateau of effect and completion of Phase 1, patients enter Phase 2, the maintenance phase, which involves manipulative therapy performed by the patient and continuance of the latter 3 interventions.

Many therapists are reluctant to perform CDT on patients with persistent or recurrent disease in the area affected by LE; this is sometimes termed 'malignant' LE. These therapists fear that compressive therapy will promote metastasis by mobilizing cancer cells and disseminating them through lymphatic tracts. However, the capacity of a cancer to metastasize is governed by variables at the cellular level, and there is no evidence in cancer biology to suggest that simple fluctuations in pressure can induce metastasis.[5] Other therapists have been concerned that disease in the draining anatomic bed will render CDT less effective because that mechanical obstruction is more robust than the fibrosis usually encountered. Because this practice has been infrequently documented, there is limited evidence of the impact that CDT has on LE in the setting of such disease. In the current study, we describe our experience with such patients.

MATERIALS AND METHODS

Cancer survivors who develop LE are referred to CDT-certified therapists at 2 Atlanta-area clinics. The extent of LE is quantified at regular intervals throughout Phase 1, such that total differences in volume can be calculated from measurements taken at the beginning and end of Phase 1. The assessment of LE is performed by interval measurements of girth along the affected limb and computation of a volume.[6] A difference in girth $\geq$2 cm between a patient's limbs is sufficient to diagnose LE. Repeat treatments due to recrudescence of LE after a patient had completed Phase 1 are considered separate events. Patients with bilateral LE had therapy for each limb considered separately.

Patients diagnosed with secondary LE were offered a 2-phase CDT regimen. Phase 1 involves MLD, skin and nail care, multilayer compression bandages to be worn at all times, and therapeutic (decongestive) exercise. MLD is performed by a certified therapist during 60- to 90-minute sessions scheduled daily (excluding weekends), or as frequently as patient availability permits. Light pressure is applied in such a way that it directs lymph to lymphovenous anastamoses and facilitates drainage into the venous circulation. The compression technique also stimulates the opening of alternative lymphatic tracts, improves the effectiveness of muscle and joint pumps during activity, prevents reaccumulation of evacuated lymph fluid, conserves the results achieved during MLD, and helps break up and soften deposits of connective and scar tissue.

Education is crucial to minimize the risk of infection in areas affected by LE. As part of the Phase 1 intervention, patients are taught critical elements of skin and nail care, including the use of pH-balanced soaps and moisturizers and regular inspection of the affected limb for signs of infection or trauma. Patients enrolled in CDT wear compression bandages 24 hours a day during Phase 1. These customized, multilayered bandages increase tissue pressure in the affected extremity to prevent stagnation of lymph fluid. The final aspect of therapy is decongestive exercise, consisting of movements performed against low resistance and with high repetition. Patients wear their compression bandages during exercise. Phase 1 of CDT is completed when regular volume measurements reflect a plateau in LE volume, whereupon the patient is judged to have achieved maximal reduction in LE from this intensive therapy.

Although the total regimen of CDT involves a second phase dependent on self-care (including self-MLD, skin and nail care, modified wearing of compression garments, and therapeutic exercise) to maintain the reduction in LE, the current study measures patient progress at the plateau of effect on the completion of Phase 1.

All patients diagnosed with secondary LE were treated with the 4-pronged regimen of CDT. However, the technique of MLD was modified for patients with axillary or inguinal disease at the time of therapy. In cases in which the standard pathways manipulated by LE therapists were obstructed by a new or persistent tumor, alternative tracts were targeted to redirect lymphatic flow. For the upper extremity, the anterior and posterior trunks are utilized while performing MLD, focusing on the axillo-axillary and the axillo-inguinal anastamoses. For the lower

TABLE 1
Characteristics of Patients With Locoregional Disease at the Time of CDT

Cancer diagnosis	No.
Metastatic breast cancer	11
Metastatic bladder cancer	2
Anal cancer	1
Paget disease of the scrotum	1
Melanoma	1
Lymphatic bed involved	**No.**
Axilla/chest wall	12
Pelvis/groin	7

CDT indicates complete decongestive therapy.

TABLE 2
Effect of Locoregional Disease on CDT Effectiveness: Phase 1 CDT Duration and LE Reduction

No of patients without masses	No. of patients with masses	*P*
56 (63 limbs)	16 (19 limbs)	
Volume change	**Volume change**	
Median, 22% (range, −21% to 164%)	Median, 22% (range, −23% to 72%)	.75
No. of treatments	**No. of treatments**	
Median, 12 (range, 4–23)	Median, 15 (range, 5–19)	.0016

CDT indicates complete decongestive therapy; LE, lymphedema.

extremities, the anterior and posterior trunks are also utilized, focusing on the inguino-inguinal and inguino-axillary anastamoses.

Following approval by the Emory University Institutional Review Board, a survey was performed of patients treated between January 2004, and March 2007. Data regarding LE (number of treatments, extent of edema) were prospectively collected on this protocol, but clinical data were collected retrospectively. The volume reduction in LE among patients completing Phase 1 therapy for LE in the presence of axillary/chest wall or inguinal/pelvic masses was compared with the volume reduction among patients with LE in the absence of such masses. We also assessed for both groups of patients the number of sessions of MLD necessary to achieve LE plateau. Comparisons were made using a rank sum test.

RESULTS

Seventy-two LE patients (82 limbs) underwent CDT and completed Phase 1 therapy. Their primary cancers had generally been treated by surgery, RT, or both. These are not considered variables to outcome because our group has shown previously that neither prior RT nor extent of axillary sampling impacts the volume of LE reduction or the number of treatments to achieve Phase 1 plateau.[6] Sixteen patients (19 limbs) had persistent or recurrent disease in the area treated by CDT. Table 1 describes these patients in greater detail.

For all limbs, the median number of treatments to achieve a plateau of effect was 12 (range, 4–23 treatments), and the median reduction in LE volume was 22% (range, −23% to 164%; negative numbers indicate that LE worsened with therapy). Table 2 presents volume and treatment data by the presence or absence of locoregional disease. The extent of LE reduction was not found to be significantly different among the 19 limbs with lymphatic bed lesions (median of 22%; range, −23% to 72%) compared with the 63 limbs without such masses (median of 22%, range, −21% to 164% [$P = .750$]). Significantly more sessions were required to complete Phase 1 in the 19 limbs with locoregional disease (median of 15 session; range, 5–19 sessions) than the 63 limbs (56 patients) without locoregional disease (median of 12 sessions; range, 4–23 sessions [$P = .0016$]).

DISCUSSION

These data confirm that CDT can provide reproducible benefit to LE patients. Our group has previously discussed the efficacy of MDL/CDT in a prospective trial,[7] cost barriers to CDT delivery,[8] the role of patient adherence in maintaining LE reduction,[9] and the effect of prior lymph node dissection and RT in LE therapy success.[6] To our knowledge this is the first discussion of both the feasibility of providing CDT for patients with locoregional disease in the draining lymphatic bed and of outcomes of its use. These data are encouraging, and certainly should placate the reluctance of therapists to provide CDT to such patients. It is clear from our experience that the effect for patients with such masses may be equivalent to that in patients without them, but will require more visits to achieve. These data also should be of benefit to healthcare organizations that may authorize the same number of therapy visits despite the patient's clinical situation.

An important difference between our 2 patient cohorts is the use of concomitant therapy. No patient received concurrent RT and LE therapy. Patients with LE in the presence of active disease generally continued receiving chemotherapy during CDT, whereas the majority of patients without locoregional disease did not, although hormonal therapy was frequently prescribed. The presence or absence of systemic therapy during CDT is not treated explicitly in this

review because it is 1) expected that patients with active disease will receive chemotherapy in most healthcare environments regardless of LE; and 2) our retrospectively available data did not provide sufficient granularity concerning concurrent chemotherapy. Allowing concurrent therapy in the patient cohort with active disease makes our results more generalizable and reproducible to that cohort of patients.

It must be noted that no mention is made herein of how long the effects produced in Phase 1 of CDT for these patients lasted, and whether there were differences in the *duration* of effect in the presence of locoregional disease. The duration of response is especially difficult to determine in this nonrandomized cohort analysis of patients with vastly different disease biology (potentially cured vs active disease). This question is also more difficult to assess because results during Phase 2 (maintenance) are extremely variable within any given population. We have previously described the crucial aspect of patient adherence to duration of effect[9]; patient-related and disease-related variables during Phase 2 increase dramatically over the relatively constant clinical situation existing during the active treatment phase of Phase 1. This patient variability is evident in Table 2, in which 2 patients had *worsening* LE during Phase 1 (increasing volume as denoted by negative values). Certainly, patients with masses may be retreated for recrudescent symptoms, although many of our patients died within a brief period of time after CDT.

The results of the current study have shown that it requires more visits to achieve a plateau in patients with locoregional disease, but that the increased number of visits is justified by the benefit provided. CDT has been shown not only to decrease volume, but also to diminish discomfort, improve mobility and function, prevent infection, and ultimately improve quality of life.[7,10,11] Furthermore, the development of LE in patients with locoregional disease can provide clinical clues as to their clinical management. An example is noted in Figure 1. In this gentleman's case, LE was secondary to the enormous soft-tissue extent of a scapular metastasis of nonsmall cell lung cancer. The lesion was irradiated and then CDT provided. This yielded gratifying relief of LE for several months, at which time there was a recrudescence of LE. This return of symptoms caused concern regarding regrowth of the lesion, prompting the attending oncologist to scan the patient. This revealed tumor regrowth. Such a scenario is not uncommon if LE presents several years after breast cancer therapy in the absence of a specific instigating factor. Under such circumstances, a prudent oncologist will obtain imaging to ensure that LE is not due to a deep-seated chest wall or axillary recurrence of disease.

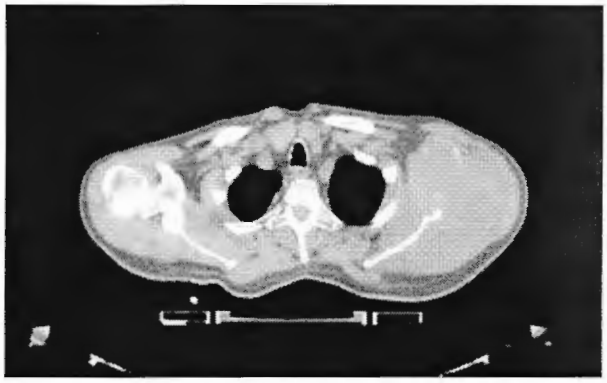

FIGURE 1. Computed tomography scan (limb 17) revealing the extent of left axillary involvement secondary to a scapular metastasis at time of complete decongestive therapy.

As a retrospective analysis, this analysis has some drawbacks. As noted, data regarding concurrent chemotherapy use are incomplete. Because we did not randomize patients, some bias may be present in terms of duration of therapy, but because this article was conceived and executed after the patients had completed therapy, we consider this to be minimal. It is also possible—although unlikely—that the number of treatments for a patient was truncated because of expiration of health plan authorization. Nevertheless, we consider these data to provide initial validation of the benefit of CDT for patients with active disease in the draining anatomic bed.

Conclusions

The use of CDT is appropriate for patients with LE in the presence of axillary/chest wall or inguinal/pelvic disease. Results in terms of LE volume reduction are similar to those in patients without such disease, but require significantly more therapy sessions to achieve. Because this patient population derives benefit from manipulative therapy, this critical intervention should not be with held.

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