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References

1. Dudgeon DJ, Kristjanson L, Sloan JA, Lertzman M, Clement K. Dyspnea in cancer patients: prevalence and associated factors. J Pain Symptom Manage 2001;21:95–102.

2. Kloke M, Cherny N, ESMO Guidelines Committee. Treatment of dyspnoea in advanced cancer patients: ESMO Clinical Practice Guidelines. Ann Oncol 2015;26:169–173.

3. Yamaguchi T, Goya S, Kohara H, et al. Treatment recommendations for respiratory symptoms in cancer patients: clinical guidelines from the Japanese Society for Palliative Medicine. J Palliat Med 2016;19:925–935.

4. Elsayem A, Bruera E. High-dose corticosteroids for the management of dyspnea in patients with tumor obstruction of the upper airway. Support Care Cancer 2007;15:1437–1439.

5. Lin RJ, Adelman RD, Mehta SS. Dyspnea in palliative care: expanding the role of corticosteroids. J Palliat Med 2012;15:834–837.

6. Hardy JR, Rees E, Ling J, et al. A prospective survey of the use of dexamethasone on a palliative care unit. Palliat Med 2001;15:3–8.

7. Matsuo N, Morita T, Iwase S. Efficacy and undesirable effects of corticosteroid therapy experienced by palliative care specialists in Japan: a nationwide survey. J Palliat Med 2011;14:840–845.

8. Yamaguchi T, Matsunuma R, Suzuki K, et al. The current practice of opioid for cancer dyspnea: the result from nationwide survey of Japanese palliative care physicians. J Pain Symptom Manage 2019;58:672–677.

9. Mori M, Shirado AN, Morita T, et al. Predictors of response to corticosteroids for dyspnea in advanced cancer patients: a preliminary multicenter prospective observational study. Support Care Cancer 2017;25:1169–1181.

10. Hui D, Kilgore K, Frisbee-Hume S, et al. Dexamethasone for dyspnea in cancer patients: a pilot double-blind, randomized, controlled trial. J Pain Symptom Manage 2016;52:8–16.

Multicomponent Compression Bandaging for Refractory Bilateral Lower Extremity Edema of Multifactorial Origin in Cancer Patients: A Retrospective Case Series

To the Editor

Edema has numerous causes[1,2] and can negatively affect mobility, comfort, quality of life,[3] and activities of daily living.[4] Treatment for edema generally consists of reversal of underlying disorder, sodium restriction, diuretics, leg elevation, and physical exercise.[1] Diuretics are often erroneously given for all forms of edema, and the long-term use of diuretics may induce chronic edema by disturbing the renin-angiotensin relationship.[5] Diuretics may cause adverse effects (e.g., hypotension or renal insufficiency) without improving edema in certain patients, including those with hypoalbuminemia and/or lymphedema.[4] These challenges highlight the need to use nonpharmacologic approaches when appropriate, rather than resorting to the immediate use of diuretics.[1] In this case series, we report the outcomes of five cancer patients who underwent multicomponent compression bandaging, a standard treatment technique recommended for lymphedema and chronic venous insufficiency, for refractory bilateral lower extremity edema (BLE) of multifactorial origin.

Methods

In this retrospective study, a physiatrist and a physical therapist tracked patients who were referred for lower extremity multicomponent compression bandaging between February 2016 and June 2018. The inclusion criteria for this study were 1) moderate to severe lower extremity edema that was refractory to the usual treatments (i.e., diuretics in combination with physical exercise), 2) referral for multicomponent compression bandaging, and 3) limb circumference measurement availability for at least two days. Of the nine patients who were referred for compression bandaging, we excluded two patients (one with lymphedema and one with chronic venous insufficiency, as noted in clinical notes) because compression bandaging is the standard of care for these conditions.[3,6,7]

J. M. T. and S. N. contributed equally. S. N. is a co-first author.

This study was partially presented as an e-poster at the Multinational Association of Supportive Care in Cancer in San Francisco, California, in June 2019, and was presented as a poster at the MD Anderson Cancer Center/TIRR Memorial Hermann Cancer Rehabilitation Symposium in Houston, Texas, on March 29–30, 2019.

The multicomponent compression bandaging was applied by lymphedema-certified therapists, who varied from day to day depending on scheduling availability. First, nonadhesive elastic bandages (Elastomull, BSN Medical, Charlotte, NC) were applied circumferentially to all toes of bilateral lower extremity. A tubular bandage (Tricofix, BSN Medical) was then donned from the metatarsal heads to the infrapatellar region to each leg. Next, a 12-cm foam bandage (CompriFoam, BSN Medical) was applied from the metatarsal heads to the infrapatellar region in a spiral manner. Finally, an 8-cm short-stretch compression bandage (Comprilan, BSN Medical) was applied in a figure-8 pattern over the foot and ankle, and a 10-cm short-stretch compression bandage (Comprilan, BSN Medical) was applied in the same manner progressing to the thigh region, with compression decreasing proximally.

Before the first day and before the next session of compression, circumferential measurements of BLE were obtained by treating therapist using a tape measure at four anatomic landmarks (metatarsal-phalangeal joint, the ankle, 20 cm below the knee, and the knee) as this was the standard practice at our institution. All five patients underwent daily compression bandaging, although three patients each missed one day during their treatment periods (which ranged from three days to eight days) because no lymphedema-certified therapist was available on those days.

While undergoing compression bandaging, all five patients also received standard physical therapy (i.e., therapeutic exercises, gait training) that hospitalized patients receive for impaired mobility. Compression bandaging is more successful when applied in conjunction with active movement (i.e., walking).[6]

The primary outcome measure was the difference in BLE circumferences, measured in centimeters, from the first day to the last day of compression. Circumferential measurements can be taken at standard distances and can be taken at any point on the lower extremity, as long as the same anatomic landmarks are used for repeated measurements.[8] A difference of greater than 2 cm between the affected and contralateral extremity is considered clinically significant when assessing lymphedema.[8] We also evaluated changes in patients' functional status, using the functional independence measure, which is the most widely used, reliable, valid, and responsive global functional assessment tool.[9]

Results

Out of the seven patients who started compression bandaging, two patients developed dyspnea after the first compression bandaging session and were encouraged to discontinue compression bandaging treatments. The remaining five patients (total of six admissions), including one with stable dyspnea, were fully evaluable for at least two or more sessions of compression bandaging therapy and these patients were noted to have refractory peripheral edema of multifactorial origin in clinical notes. These were at least two to four of the following etiologies of edema identified per admission: intravenous fluid overload, hypoalbuminemia, chronic graft-versus-host-disease, steroid myopathy, and steroid-induced edema.

Four patients had improvement in at least one of the limb circumferences at all measured anatomic sites (Table 1). Patient 3 had two anatomic sites on the same extremity with negative numbers (−0.5 and −4.1 cm difference, indicating progression of the edema rather than improvement), but all of his other sites on both extremities had positive numbers. Patient 4 had mixed results; some anatomic sites improved, and the left lower extremity overall improved distally at the ankle compared with the right lower extremity. All five patients (with six total admissions) had stable or improved functional independence measure scores and the distance ambulated improved in all cases. They were fitted with either compression stockings or an adjustable compression garment (CirCaid) for maintenance of edema reduction.

All five patients reported a dyspnea level of 0 on a rating scale of 0 to 10 on the first and last days of compression, except for Patient 3, who had intermittent complaints of dyspnea due to pneumonia after recent neck surgery. No new pain or skin breakdown was reported or identified in these five patients. Biochemical profiles such as sodium, blood urea nitrogen, and creatinine remained stable on the first and last days of compression.

Comments

Reports of the use of multicomponent compression bandaging to manage refractory peripheral edema are limited to few cases with cancer and/or advanced diseases.[5,10] Although the standard treatment for refractory peripheral edema is diuretics,[2] the use of multicomponent compression bandaging, which is a subset of the complete decongestive therapy recommended for lymphedema,[3] may be beneficial specifically for refractory edema of multifactorial origin as demonstrated by this case series. All five patients had refractory edema after three to five days of diuretics dose adjustments and two patients with hypoalbuminemia also received albumin supplementation before deemed by physicians as needing compression bandaging as an additional treatment option. These patients then remained on the same edema medication regimen while undergoing compression bandaging except when there was contraindication

Table 1
Outcome Measurements on First and Last Day of Compression Bandaging

Outcome Measurements	First Day	Last Day	Difference
Patient 1			
R MTP, cm	26.0	25.5	0.5
R ankle, cm	29.8	27.0	2.8
R knee, 20 cm below, cm	36.8	30.5	6.3
R knee, cm	50.9	45.1	5.8
L MTP, cm	25.6	25.0	0.6
L ankle, cm	29.8	27.2	2.6
L knee, 20 cm below, cm	35.7	31.5	4.2
L knee, cm	51.9	45.0	6.9
FIM locomotion score	1	2	1
Distance walked, device	3 ft (0.30 m), RW	100 ft (30 m), RW	97 ft (29.7 m)
Patient 2A[a]			
R MTP, cm	27.0	25.0	2.0
R ankle, cm	27.0	24.2	2.8
R knee, 20 cm below, cm	28.2	26.5	1.7
R knee, cm	40.0	40.0	0.0
L MTP, cm	28.0	25.8	2.2
L ankle, cm	28.1	25.6	2.5
L knee, 20 cm below, cm	29.0	27.5	1.5
L knee, cm	40.0	40.0	0.0
FIM locomotion score	5	6	1
Distance walked, device	150 ft (46 m), RW	350 ft (107 m), RW	200 ft (61 m)
Patient 2B[a]			
R MTP, cm	31.4	29.0	2.4
R ankle, cm	31.2	27.5	3.7
R knee, 20 cm below, cm	39.9	33.0	6.9
R knee, cm	44.0	40.5	3.5
L MTP, cm	29.9	28.8	1.1
L ankle, cm	32.5	29.0	3.5
L knee, 20 cm below, cm	39.0	32.5	6.5
L knee, cm	42.1	41.5	0.6
FIM locomotion score	5	5	0
Distance walked, device	660 ft (201 m), RW	750 ft (229 m), RW	100 ft (28 m)
Patient 3			
R MTP, cm	26.0	23.9	2.1
R ankle, cm	28.8	27.5	1.3
R knee, 20 cm below, cm	38.9	36.2	2.7
R knee, cm	42.0	39.8	2.2
L MTP, cm	26.0	23.4	2.6
L ankle, cm	27.0	31.1	−4.1
L knee, 20 cm below, cm	34.5	35.0	−0.5
L knee, cm	42.5	38.0	4.5
FIM locomotion score	1	1	0
Distance walked, device	10 ft (3 m), RW	65 ft (20 m), RW	55 ft (17 m)
Patient 4			
R MTP, cm	29.0	28.0	1.0
R ankle, cm	31.0	31.6	−0.6
R knee, 20 cm below, cm	44.0	46.0	−2.0
R knee, cm	50.0	51.0	−1.0
L MTP, cm	29.0	28.0	1.0
L ankle, cm	33.0	27.4	5.6
L knee, 20 cm below, cm	44.0	45.0	−1.0
L knee, cm	50.5	51.5	−1.0
FIM locomotion score	0	5	5
Distance walked, device	Unable to assess/perform	500 ft (152 m), RW	500 ft (152 m)
Patient 5			
R MTP, cm	26.5	21.6	4.9
R ankle, cm	31.2	29.6	1.6
R knee, 20 cm below, cm	45.6	39.2	6.4
R knee, cm	53.6	45.9	7.7
L MTP, cm	25.9	23.3	2.6
L ankle, cm	30.6	27.7	2.9
L knee, 20 cm below, cm	42.5	35.1	7.4
L knee, cm	52.6	48.2	4.4
FIM locomotion score	1	1	0
Distance walked, device	15 ft (5 m), RW	35 ft (11 m), RW	20 ft (6 m)

MTP = metatarsophalangeal joint; FIM = functional independence measure; RW = rolling walker.
[a]Patient 2 underwent compression bandaging during two separate hospital stays.

to the use of diuretics (orthostatic hypotension with Patient 2a led to discontinuation of diuretics).

The relatively good rate of adherence to the 24-hour wear schedule without any adverse events among our patients was highly encouraging. Two patients discontinued the intervention as advised after experiencing dyspnea because it may reflect an adverse effect of fluid redistribution[3] from the lower extremities to systemic circulation and to the lungs. Interestingly, although intravenous fluid overload was a cause of the edema for all five patients, all five were able to tolerate multicomponent compression bandaging. Compression bandages must be applied by trained personnel[6,7] and it is contraindicated in peripheral artery disease.[6] More research is necessary to better define the roles of physical therapy, compression therapy, and pharmacologic treatment in managing refractory peripheral edema of multifactorial origin as these cases can be challenging to treat.

Owing to the small number of patients in our study, we were not able to calculate statistics. Thus, we cannot determine the generalizability of our findings. Weight, thigh, and leg length measurements were not taken as part of regular patient care. In future studies, these should be documented daily during treatment for edema so that it can be correlated with limb volume reduction. Close cooperation between physicians, physical therapists, and lymphedema-certified providers is essential as compression may have additional effect on edema but it needs close fluid management by physicians.

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References

1. O'Brien J, Chennubhotla S, Chennubhotla R. Treatment of edema. Am Fam Physician 2005;71.

2. Brater DC. Treatment of refractory edema in adults. In: Post TW, ed. UpToDate. Waltham, MA: UpToDate; 2018. Available from https://www.uptodate.com/contents/treatment-of-refractory-edema-in-adults?source=search_result&search=refractory%20edema&selectedTitle=1~77. Accessed May 21, 2019.

3. Mehrara B. Clinical staging and conservative management of peripheral lymphedema. In: Post TW, ed. UpToDate. Waltham, MA: UpToDate; 2019. Available from http://www.uptodate.com/contents/clinical-staging-and-conservative-management-of-peripheral-lymphedema?source=preview&language=en-US&anchor=H517749948&selectedTitle=1~150#H517749948. Accessed March 7, 2019.

4. Bar-Sela G, Omer A, Flechter E, Zalman D. Treatment of lower extremity edema by subcutaneous drainage in palliative care of advanced cancer patients. Am J Hosp Palliat Care 2010;27:272–275.

5. Tennison JM, Fu JB, Bruera E. Improvement of refractory peripheral edema with multilayered compression bandaging: a case report. Phys Ther 2018;98:763–766.

6. Armstrong DG, Meyr AJ. Compression therapy for the treatment of chronic venous insufficiency. In: Post TW, ed. UpToDate. Waltham, MA: UpToDate; 2019. Available from https://www.uptodate.com/contents/compression-therapy-for-the-treatment-of-chronic-venous-insufficiency?source=search_result&search=Compression%20therapy%20for%20the%20treatment%20of%20chronic%20venous%20insufficiency&selectedTitle=1~150. Accessed February 15, 2019.

7. O'Meara SCN, Nelson EA, Dumville JC. Compression for venous leg ulcers. Cochrane Database Syst Rev 2012;11:CD000265.

8. Mehrara B. Clinical features and diagnosis of peripheral lymphedema. In: Post TW, ed. UpToDate. Waltham, MA: UpToDate; 2018. Available from http://www.uptodate.com/contents/clinical-features-and-diagnosis-of-peripheral-lymphedema?source=search_result&search=lymphedema&selectedTitle=1%7E150. Accessed February 15, 2019.

9. Cournan M. Use of the functional independence measure for outcomes measurement in acute inpatient rehabilitation. Rehabil Nurs 2011;36:111–117.

10. Gradalski T. Diuretics combined with compression in resistant limb edema of advanced disease-A case series report. J Pain Symptom Manage 2018;55:1179–1183.