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When lymphedema becomes elephantiasis: a multidisciplinary challenge in a patient with severe obesity and cardiopulmonary comorbidities

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Abstract

Lymphedema is a progressive condition that can reach an extreme, debilitating stage known as elephantiasis. This case presents a 57-year-old man with stage III by International Society of Lymphology (ISL) lower limb primary lymphedema diagnosed by a lymphoscintigraphy, morbid obesity (BMI >65), obesity hypoventilation syndrome, chronic pulmonary heart disease, and story of prior pulmonary embolism. At admission, high-resolution ultrasound revealed severe subcutaneous thickening, with maximum values exceeding 11 cm. A multidisciplinary inpatient approach was implemented involving vascular surgeons, internists, cardiologist, urologist, pneumologist, dietitians, physiotherapists, and specialized nursing care. Only through the collaboration among all these professional figures it was possible to manage such a complex case. Treatment included high-pressure multilayer compressive bandaging and a Very-Low-Calorie Ketogenic Diet (VLCKD). This led to a significant reduction in subcutaneous thickness (up to 80% in some sites). During three weeks of hospitalization the weight loss was only 7 kg, little but nevertheless relevant, probably due to the total immobility and the poor compliance of the patient. The case underscores the importance of coordinated nutritional, vascular, and medical care in managing complex, end-stage lymphedema.

Key words: lymphedema, elephantiasis, bandage.

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Introduction

Lymphedema, particularly in its most advanced stages, represents a major clinical and social burden, especially when compounded by other chronic conditions such as morbid obesity and cardiopulmonary diseases. Elephantiasis, or stage III lymphedema, is rare in developed countries and often refractory to standard treatments.[1] The standard treatment of primary lymphedema is based mainly on decongestive therapy. The treatment is performed in different ways depending on the severity of the clinical condition. The more severe the starting condition is, in terms of limb volume and level of fibrosis, the more the treatment must be personalized. The normal approach to decongestion in patients with primary lymphedema includes manual lymphatic drainage associated with high-pressure multilayer bandages performed for several weeks according to the severity of the condition, targeted physical exercises performed on the ground and in water, and meticulous skin care to avoid the formation of lymphatic ulcers at high risk of infection. In the maintenance phase, the use of compression garments from 23 mmHg upwards to be worn during the day represents a cornerstone to limit the progression of the disease. The pharmacological approach has a marginal role and there are currently no specific drugs able to significantly modify the natural history of lymphedema. As for the surgical options, it must be noted that in cases of primary lymphedema they are scarcely applicable: lymphatic derivation procedures, such as lymphatic-venous anastomoses or lymph node transfer, have no indication in primary lymphedema with documented lymphatic aplasia, while excisional interventions present high risks and uncertain benefits in patients with severe obesity and serious comorbidities.[1] It is evident that in a patient like the one we examined it is not possible to perform standard protocols, the therapeutic approach that we carried out will be explained in the following chapters. The main focus was placed on the reduction of volumes through bandages performed more frequently and the prevention of infections. Any type of physical exercise and manual lymphatic drainage, under this condition of hospitalization, would have been impossible to apply. The excisional surgery of fibro-adipose tissue can be a valid support but only in the phase following decongestion and especially after the stabilization of cardiopulmonary comorbidities.

Case Report

A 57-year-old man originally from Cameroon was admitted for diagnostic and therapeutic management of longstanding bilateral lower limbs primary lymphedema. His medical history included hypertension, chronic pulmonary heart disease, obesity hypoventi-

lation syndrome (on nocturnal Continuous Positive Airway Pressure, CPAP), previous right-sided pulmonary embolism, childhood poliomyelitis with resultant left leg weakness, and prior femoral fracture. Body weight was 195 kg with a BMI over 65. The hospitalization was from March 13 to April 5 of 2025. The patient was admitted to internal medicine for the relevant comorbidities above mentioned to lead the vascular intervention team to treat him (Figure 1).

Diagnostic assessment

At admission and prior to treatment, high-resolution ultrasound was used to measure subcutaneous tissue thickness at four predefined lower limb sites: A = foot, B = medial malleolus, C = distal third of leg, and D = proximal third of leg (Figure 2).[2]

- Right lower limb: A = 9.06 cm, B = 7.91 cm, C = 10.56 cm, D = 10.11 cm

- Left lower limb: A = 7.28 cm, B = 7.11 cm, C = 11.77 cm, D = 9.79 cm

Laboratory testing showed suboptimal lipid control (LDL-C 92.4 mg/dL). Electrocardiogram (ECG) showed sinus rhythm with left axis deviation and T wave inversions. Chest radiography revealed global cardiomegaly with no pleural effusion. Echocardiography confirmed left atrial dilation and mild ventricular hypertrophy with preserved ejection fraction (60%).

Therapeutic intervention

A multidisciplinary approach was undertaken. Intensive decongestive bandaging was initiated, resulting in significant limb circumference reduction. Given signs of superimposed cellulitis, empirical antibiotic therapy (amoxicillin/clavulanate) was started with clinical and laboratory improvement. The anamnestic, clinical and instrumental characteristics such as the absence of lymphatic vessels and the presence of dermal backflow at the lymphoscintigraphy raised the suspicion of Milroy's disease. This disease consists in a form of congenital primary lymphedema generally transmitted in an autosomal dominant way. It is due to mutations of the

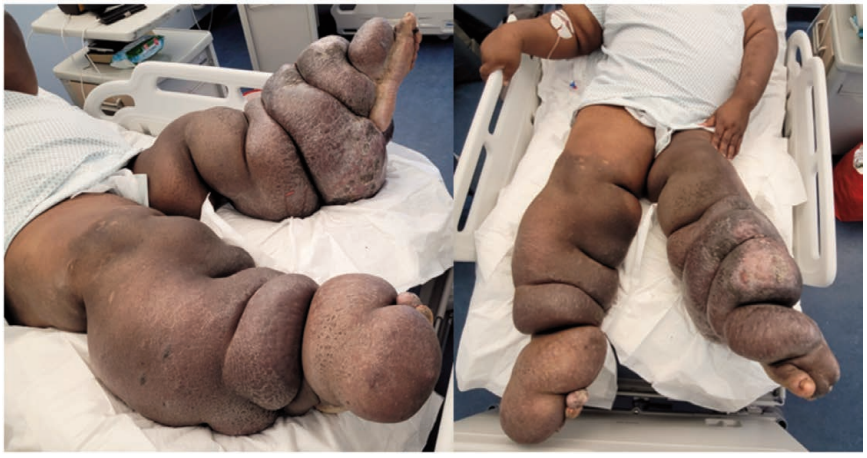

Figure 1. The patient on the first day of hospitalization, before the ultrasound examination and the application of the first bandage.

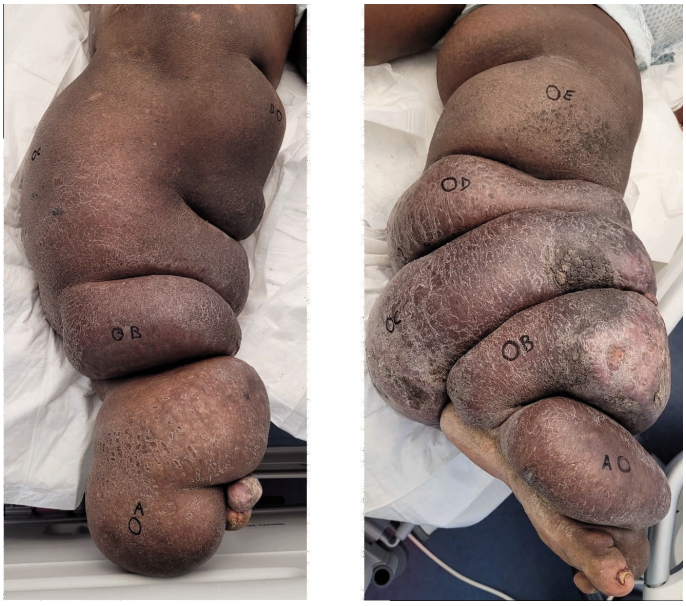

Figure 2. Representation of the points that were selected as ultrasound reference for subcutaneous thickness pre- and post-treatment.

FLT4 gene which encodes for the VEGFR-3 receptor, fundamental for the development and function of the lymphatic vessels. The presence of these mutations leads to hypoplasia or aplasia of the lymphatic vessels.[1,2] The onset occurs in the first years of life with prevalent localization in the lower limbs and the course is chronic and progressive. The diagnosis of certainty is made after genetic analyses, which is why a molecular analysis of a gene panel was requested and sent to the Center of Molecular Genetics of the University of Pisa, a center specialized in this kind of investigations. The bandaging was performed, twice a week, by applying soft silicone foam dressings (Mepilex® Lite) to protect the large skin folds. This was followed by the application of a foam bandage (Rosidal® Soft) and, more externally, a rigid elastic bandage (Rosidal® K). An outer layer of cohesive bandage was applied to keep the underlying dressings in place. Medications were also performed on small ulcers on the toes, which healed without issues in the following days (Figure 3). The patient was transitioned to a Very-Low-Calorie Ketogenic Diet (VLCKD) of 1000 kcal/day with vitamin and electrolyte supplementation, achieving a 7 kg weight loss during admission. Statin therapy was initiated targeting LDL <70 mg/dL. The patient, as already mentioned, presented numerous comorbidities that required the intervention of many professional figures. A cardiologic evaluation was performed for the condition of chronic right heart failure and a pneumologic evaluation for the recent history of acute respiratory failure after pulmonary embolism, which however did not lead to changes in the patient's previous therapy. Because of a known bulbar urethral stricture, a urethrocystoscopy with subsequent urethrotomy of about 3 cm at the presphincteric level was performed. It should also be noted that specialized physiotherapists for the treatment of patients with severe obesity were involved; their intervention was fundamental since at the time of discharge the patient was able to perform 2-3 steps with the walker, an ability that was not present at the time of admission. After only the first cycle of bandages some small cutaneous ulcers with heavy bleeding developed, which is why the colleagues of Internal Medicine, after an evaluation of the risks and benefits of a possible modification of the anticoagulant therapy, considered it appropriate to suspend the therapy with warfarin, which the patient was taking for the history of pulmonary embolism, and to introduce a therapy with low-molecular-weight heparin at prophylactic dosage to reach a proper compromise between prevention of pulmonary embolism and risk of bleeding.

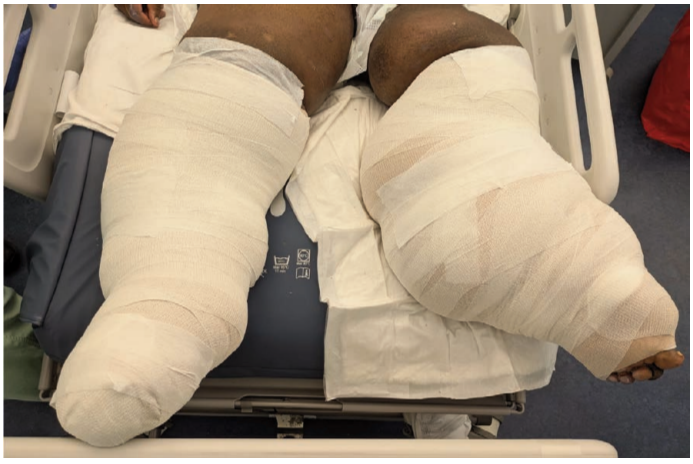

Figure 3. First therapeutic bandage applied on the patient.

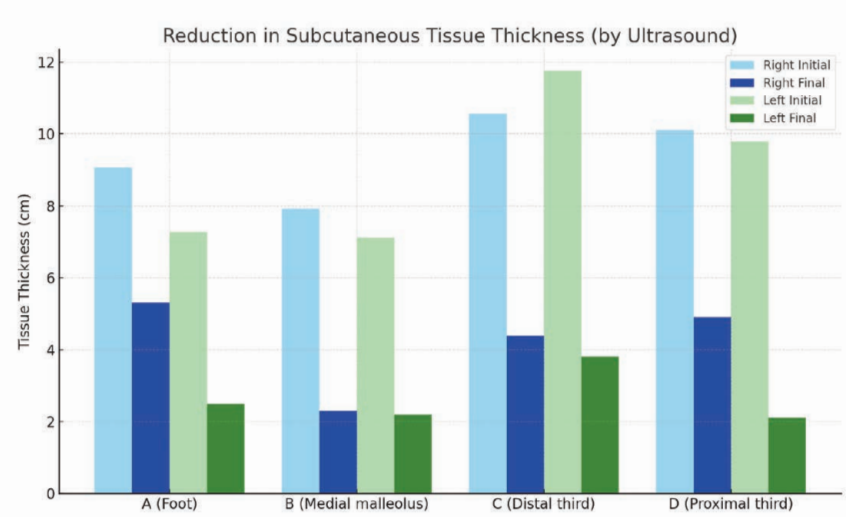

Figure 4. Ultrasound results of the subcutaneous thickness at the points selected as reference markers.

Follow-up and outcomes

At discharge, the patient was hemodynamically stable, afebrile, and breathing ambient air. He was ambulatory with a walker under physiotherapy supervision and continued VLCKD. A follow-up plan included vascular dressing changes and dietary monitoring. Functional evaluation indicated moderate-to-severe dependence in activities of daily living (ADL 3/6, IADL 3/8).

Subcutaneous tissue thicknesses were markedly reduced at discharge compared to admission (Figure 4).

- Right lower limb: A = 5.3 cm, B = 2.3 cm, C = 4.4 cm, D = 4.9 cm

- Left lower limb: A = 2.5 cm, B = 2.2 cm, C = 3.8 cm, D = 2.1 cm

We have to report that few days after discharge, the patient developed a pulmonary embolism which led to a two-week stay in the intensive care unit at another hospital. The anticoagulant strategy undertaken was unsuccessful, the compromise reached to avoid the bleeding of the cutaneous ulcers, still present at discharge, was not sufficient for the total prevention of pulmonary embolism episodes. The mild normocytic anemia present at admission (Hemoglobin, Hb=10 mg/dL) led to the priority being shifted from the total prevention of pulmonary embolism to the avoidance of further anemia. During these weeks, we were unable to continue the compression therapy. At the end of the hospitalization, the patient resumed the regular follow-up agreed with us, doing the application of the bandage once a week. After the hospitalization for the pulmonary embolism, although the patient experienced a slight increase in the volume of the lower limbs due to the interruption of compression therapy, the edema appeared markedly different in consistency compared to the first admission to our unit. The fibrous and hardened component was almost completely lost, giving way to a soft edema which, after only two bandaging sessions, returned to the volume observed at the time of discharge from our center.

Discussion

This case illustrates the therapeutic complexity of managing end-stage lower limb lymphedema in a patient with severe obesity and cardiopulmonary comorbidities. The condition was consistent with stage III lymphedema according to the International Society of Lymphology, typically characterized by chronic, irreversible changes such as dermal thickening, fibrosis, and functional disability.[1] The marked improvement in subcutaneous tissue thickness is noteworthy and likely attributable to the consistent use of high-pressure, multi-layer compressive bandaging applied weekly, which remains a cornerstone of conservative management.[3-5] The addition of a very-low-calorie ketogenic diet likely enhanced outcomes by supporting weight loss and possibly reducing systemic inflammation, though causality cannot be definitively established.[4,6] The weight loss was 7 kg, particularly limited, although clinically relevant because in a patient with severe obesity and multiple comorbidities even such a limited weight reduction can bring an advantage in terms of improvement of vital parameters and reduction of the risks related to some conditions such as heart failure and the onset of episodes of pulmonary embolism in a predisposed patient. The reasons why during the hospitalization the weight loss was so limited despite the VLCKD are not entirely clear. A certain cause is represented by the immobility and a probable poor compliance of the patient. It must be considered that in the 7 kg lost one must also include the share of interstitial fluid drained thanks to the multilayer bandages.

One limitation of this report is the short follow-up period, which restricts evaluation of long-term maintenance of volume reduction. Additionally, the patient's multiple comorbidities limited rehabilitation and functional recovery, highlighting the importance of early intervention before irreversible changes occur.

In light of the literature, this case aligns with evidence supporting intensive decongestive therapy but also emphasizes the challenge of treating lymphedema in patients with extreme obesity. This case does not represent only an advanced form of stage III lymphedema but an emblematic example of how complex the therapeutic management of a patient with severe obesity and cardiopulmonary comorbidities can become. Extreme obesity significantly conditions mobility, even passive mobility, increases the thromboembolic risk and worsens respiratory compliance. In addition, there were skin fragility and recurrent infectious risk, which required particularly careful dressings and bandaging strategies. The focus could not be dedicated exclusively to the treatment of lymphedema but also to the concomitant pathologies, just think of the urethrocystoscopy intervention mentioned. In this context, care could not be based on a single therapeutic modality, but required a multidisciplinary approach coordinated among vascular specialists, internists, cardiologists, pulmonologists, urologists, dietitians, physiotherapists and nurses, with the necessity to constantly balance the risks for the patient deriving from the modifications of the therapy and from interventional procedures. This case therefore underlines how the management of elephantiasis in a multimorbid patient must be understood not only as the treatment of a lymphatic condition as is often done in an outpatient setting, but as a real "multidisciplinary challenge".[1,3,7] This aligns with evidence from recent studies evaluating subcutaneous tissue thickness as a quantitative marker of treatment response in lower limb edema,[8] as well as with exercise-based interventions in chronic venous and lymphatic disease.[9]

This case supports the notion that even advanced lymphedema can be partially reversed when intensive, coordinated care is applied, despite significant systemic burden.

Conclusions

Elephantiasis in the context of morbid obesity and cardiopulmonary disease presents significant clinical challenges. A tailored, multidisciplinary inpatient approach can yield meaningful improvements even in advanced disease stages, emphasizing the role of nutritional, vascular, and physiatric co-management.

References

1. Executive Committee of the International Society of Lymphology. The diagnosis and treatment of peripheral lymphedema: 2023 Consensus Document of the International Society of Lymphology. Lymphology 2023;56:133-51.
2. Tessari M, Gianesini S, Menegatti E, et al. Effects of intermittent pneumatic compression treatment on clinical and inflammatory parameters in patients with leg edema. J Vasc Surg Venous Lymphat Disord 2018;6:501-8.
3. Bertsch T, Jünger M. Compression therapy of the extremities with lymphedema: a review of current evidence. Phlebology 2014;29:27-33.

4. Paoli A, Rubini A, Volek JS, Grimaldi KA. Beyond weight loss: a review of the therapeutic uses of very-low-carbohydrate (ketogenic) diets. Eur J Clin Nutr 2013;67:789-96.
5. Partsch H, Damstra RJ, Tazelaar DJ, et al. Multilayer compression bandaging: effective management of lymphedema. Int Angiol 2016;35:193-200.
6. Andriessen A, Abel M. Experimental study on efficacy of compression systems with a high static stiffness index for treatment of venous ulcer patients. Veins and Lymphatics 2013;2:e8.
7. Keeley V, Crooks S, Locke J, et al. A quality-of-life measure for limb lymphoedema (LYMQOL). J Lymphoedema 2010;5:26-37.
8. Tessari M, Pagani A, Gianesini S, et al. Randomized controlled trial on dryland and thermal aquatic standardized exercise protocol for chronic venous disease (DATA study). J Vasc Surg Venous Lymphat Disord 2021;9:123-31.
9. Benigni J-P, Flour M, Uhl J-F. Adjustable compression wraps: Back to the Future. Veins and Lymphatics 2024;13:12934.
10. Hirai M, Partsch H. The mannequin-leg: a new instrument to assess stiffness of compression materials. Veins and Lymphatics 2013;2:e3.
11. Lee BB, Bergan J, Rockson SG. Lymphedema: diagnosis and treatment. Springer; London, UK; 2007.
12. Benigni J-P, Uhl J-F, Balet F, Filori P. Interface pressures and stiffnesses of different bandages studied on a Hiraï leg. Veins and Lymphatics 2024;13:12240.
13. Schuren J. In vitro measurements of compression bandages and bandage systems: a review of existing methods and recommendations for improvement. Veins and Lymphatics 2014;3:2107.
14. Lee BB, Rockson SG, Bergan J. Lymphedema: a concise compendium of theory and practice. Second edition. Springer; Cham, Switzerland; 2018.

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