



Physiotherapeutic approach in a lymphoedema patient: A case report

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Abstract

Lower-limb lymphedema is a chronic condition characterized by impaired lymphatic drainage, resulting in persistent swelling, tissue fibrosis, recurrent infections and functional limitations. This case report describes the physiotherapeutic management of a 50-year-old male with chronic unilateral left lower-limb lymphedema associated with venous insufficiency and recurrent cellulitis. The patient underwent 24 sessions of Complete Decongestive Therapy (CDT), including manual lymph drainage, multilayer short-stretch compression bandaging, therapeutic exercises, skin care and patient education. Following the intervention, the patient demonstrated approximately 25% reduction in limb volume, improvement in the six-minute walk distance from 212.8 m to 310 m, increased lower-limb muscle strength, improved gait and better functional capacity. This case highlights the effectiveness of a comprehensive physiotherapy program based on CDT in reducing oedema and improving functional outcomes in chronic lower-limb lymphedema. Early intervention and long-term adherence to compression therapy are essential for sustained clinical benefits.

Keywords: Lymphoedema, complete decongestive therapy, manual lymph drainage, functional capacity, lower limb lymphoedema

Introduction

Lymphedema is a chronic condition characterized by the accumulation of protein-rich fluid in the interstitial tissues due to impaired lymphatic drainage, leading to persistent swelling, fibrosis and skin changes. Lower-limb lymphedema may occur as a result of primary lymphatic abnormalities or secondary causes such as surgery, trauma, infection, hypothyroidism, venous insufficiency, or malignancy. Progressive disease can result in recurrent cellulitis, reduced mobility, impaired functional capacity and diminished quality of life. Physiotherapy plays a crucial role in lymphoedema complete decongestive therapy (CDT), comprising manual lymph drainage, compression therapy, exercise, skin care, and patient education, is considered the gold-standard conservative treatment for reducing oedema and improving function.^[1]

Case Presentation

A 50-year-old male was apparently alright 8 years ago, when 2018 (8 years ago) he developed itching over the left ankle, followed by redness and pain after scratching the affected area, visited a local hospital, took treatment but symptoms were not subsided. Later he subsequently developed intermittent swelling of the left lower limb associated with discharge, for which Visited local hospital where wound debridement for left foot cellulitis done (admitted for 1 month in secondary care hospital). Then

continued management with glycerine application and bandaging for over a year, symptoms were subsided. In 2022 (4 years ago) he visited the tertiary hospital with complaints of recurrent episodes of left lower limb swelling, pain, fever and infection- was diagnosed with varicose veins and underwent Endo venous Laser Therapy (EVLT) of the Lt GSV (no details found). He then continued follow-up and medications for one year but discontinued wearing compression stockings after two months. In 2024 he again experienced recurrent episodes of swelling, pain, fever and visited local hospital, managed with medication and dressings. On 6/11/24- B/L LL venous Doppler done- showed -multiple dilated superficial varicosities with incompetent perforators continued conservative m/g with medication and dressings. In 2026 He developed a fungal infection on toes, for which he was visited to Dermatology Dep., (28/3/2026) was diagnosed with Elephantiasis Nostris Verrucosa (ENV), received treatment and was referred to the Physiotherapy Fitness OPD for Lymphedema management.

Currently Patient presents with c/o Chronic left lower limb swelling associated with fungal infection since 3 months. He had undergone 24 PT session with approx. 25% reduction in limb volume. PT t/t includes wound care, dressing, multi layered short stretch bandaging and lower limb strengthening, aerobic exercises.



Fig 1



Fig 2

Personal history: Appetite – Adequate, Bowel & Bladder – Intact, Sleep – Altered, Diet – Mixed, Addiction: None, Environmental history: Resides on the ground floor, Uses an Indian style Washroom, Needs to climb stairs at the railway station and have to walk through sewage contaminated water on the road from the railway station to home, also lives near a drainage channel and uses modes of public transport for commute, worked as a liftman (8 hrs at working).

Clinical Findings

Lymphoedema evaluation on Observation: Lt lower limb affected, Visible integumentary changes- Dry Skin, Dark hyperpigmented, Hyperkeratosis with verrucous (cobblestone-like) skin changes, Papillomatous Skin changes, Thickened skin, Non-pitting oedema, Visible skin fold fissures and cracks, Visible suture at ankle [past wound

debridement]- at 2 sites above medial malleolus and above lateral malleolus, Region of fungal infection seen above 2nd toe, Toe nails appear thickened, discoloured, and irregular.

On Palpation:

Oedema = Non-pitting Lt (ankle and lower leg), Pitting Rt (lower leg - grade II), Thickened skin, Stemmer's sign positive.

Sensations = B/L Lower limb sensations intact

Pulsation = Not palpable on left side due to thickened skin, Pulses palpable on right side (Dorsalis pedis, Tibialis posterior), Equal temperature of limb on both the sides.

Table 1 shows volumetric assessment, Table 2 Shows the detailed Range of Motion of bilateral Lower Limb, Table 3 shows the detailed muscle strength examination results. The Barthel Index (BI) was 80 out 100, indicating that the patient was severe dependency ⁽²⁾.

Table 1: Volumetric Assessment

Volume Assessment	At Enrolment [21/4/2026]	After completion of 24 sessions [1/7/2026]
Affected Limb Volume	7816.3 ml	6248.7 ml
Difference noted	2293.6 ml	1302.3 ml
% severity	41.5 %	26.3 %

Table 2: Range of Motion for Hip, Knee & Ankle

Joint	Right (Pre)		Right (Post)		Left (Pre)		Left (Post)	
	Active	Passive	Active	Passive	Active	Passive	Active	Passive
Knee								
Flexion	10 -90 ⁰	0 -110 ⁰	0 - 110 ⁰	0 - 120 ⁰	0 - 110 ⁰	0 - 110 ⁰	0 - 120 ⁰	0 -130 ⁰
Ankle								
Dorsiflexion	0 - 15 ⁰	0 - 20 ⁰	0 - 20 ⁰	0 - 20 ⁰	0 -5 ⁰	0 -5 ⁰	0 - 10 ⁰	0 - 15 ⁰
Plantarflexion	0 - 45 ⁰	0 - 50 ⁰	0 - 50 ⁰	0 - 50 ⁰	0 -5 ⁰	0 - 5 ⁰	0 - 15 ⁰	0 - 20 ⁰

Table 3: MMT for Hip, Knee & Ankle

Joint	Right (Pre)	Right (Post)	Left (Pre)	Left (Post)
Hip				
Flexors	5	5	4	4
Extensors	4	4 -	3	4-
Abductors	4	4	4	4+
Adductors	3+	4	4	4
Internal Rotators	2-	2	Pelvic Compensation	
External Rotators	2-	2		
Knee				
Flexors	4	4	3	4

Extensors	4	4+	3	4+
Ankle				
Dorsiflexors	4	5	2	4
Plantarflexors	4	4	2	4

Flexibility: B/L Hamstring tightness +ive using 90-90 test,
B/L iliopsoas tightness +ive using Ely's test

Cardiovascular Endurance:

BHT = 12.3 seconds [Normal: 45-55 secs], SBC = 22 counts
[Normal 30-40 counts, <15- indicates severe impairment], 1
MSTS = 19 reps [Normal: 25-42 reps]

Table 4: Six Minute Walk Test Interpretation

6MWD	At Enrolment [21/4/2026]	After completion of 24 sessions [1/7/2026]
Distance covered	212.8 m	310 m
Predicted distance	537.07m	537.07m
% Predicted	39.46%	58%
Vo2 peak	7.97 ml/kg/min	10.8 ml/kg/min
METS	2.28 ml/kg/min	3.08 ml/kg/min

Special Test:

1. Venous Filling Time - 5 seconds (right)
(Normal <15 sec, this indicates venous disease)
2. Brodie Trendelenburg Test- Positive (Right)
Positive for perforator's incompetence

Left side could not be assessed as veins were not visible due to thickened skin

Gait Analysis

Step length is reduced, particularly with the unaffected limb stepping forward. Decreased stance time on the affected (left) limb. Heel strike on the affected side appears reduced, early foot-flat pattern is observed. Reduced push-off from the affected limb

Clinical Investigations

Both Lower Limb Venous Doppler (November 2024)

Left Lower Limb

DVT scan: Gross subcutaneous oedema is noted in left lower limb below knee level

LSV: Multiple varicosities noted in medial and anterolateral compartment of left lower limb, incompetent perforators noted below knee medial compartment, and at the level of ankle medial and anterolateral compartment.

SSV: Post axial continuation of SSV is noted. Incompetent perforators noted below knee posterior compartment
Multiple superficial varicosities are noted in calf region in SSV territory.

Right Lower Limb

DVT scan: No colour Doppler evidence of deep venous thrombosis

LSV: Multiple varicosities noted in medial and anterolateral compartment of right lower limb. Incompetent perforators noted above and below knee, ankle medial compartment

SSV: Multiple superficial varicosities are noted in calf region in SSV territory, incompetent perforators below knee post compartment

Impression: Multiple dilated superficial varicosities in leg region in B/L LSV & SSV territory secondary to incompetent perforators.

FNAC Left Lower Limb (June 2026): Scrape cytology s/o of squamous cells with yeast forms of Candida, without inflammatory cells, fungal hyphae, or atypical/malignant cells, suggesting superficial candidal colonization.

Table 5: Differential Diagnosis of Elephantiasis Nostras Verrucosa (ENV)

Diagnosis	Presentation
Lymphatic filariasis	Bacterial infection, tropical region. Lymphedema, hydrocele, hyperkeratosis, nodule, and papillomatous hyperplasia. Stemmer sign. Intertrigo, ulcers.
Lipoedema	Accumulation of fat. In the low part of body, sparing the feet. Bilateral, symmetrical. Negative Stemmer sign. No epidermal changes.
Lip dermatosclerosis	Venous stasis. Hyperpigmentation. Proximal leg oedema and distal swelling. Inverted bottle appearance.
Papular mucinosis	Waxy papules and plaques. Slightly reddish or skin-coloured, dome-shaped, or flat papule.
Pretibial myxoedema	Thyroid dermopathy. Plaques on the anterior tibia and dorsum of the feet. Pink or purple brown papules or nodules, nonpitting oedema.
Stewart-Treves Syndrome	Angiosarcoma. Purple-red papule. Complications: oedema, ulceration, infection, haemorrhage.

The pathophysiology of ENV is still not clear, but it was observed that the chronic accumulation of the lymph and protein-rich interstitial fluid in the tissues increases the volume of the limb and causes tissue deformations. Many cases develop lymphangitis due to fibroblast proliferation, which causes the fibrosis of the dermis and subcutaneous tissues, which decreases the local immune system. As the infection-associated inflammation leads to the fibrosis of the lymphatic system, lymphedema progresses.^[2]

Physiotherapeutic Care

Short Term Goals:

1. Patient Education and counselling
2. To reduce swelling/ volume of Left LL
3. Weight Reduction
4. Improve muscle strength and Flexibility
5. To improve cardiovascular endurance

Long Term Goals:

1. To maintain decreased limb volume
2. To continue strength training
3. Achieve sustained weight reduction
4. Improve functional independence in ADLs
5. To improve and maintain cardiopulmonary endurance

1. Patient Education

Take short elevation breaks e.g. rest with your feet up on a bench every 2-3 hours during work. Take short breaks after every 30-45 mins to perform ankle pumps, heels raise, and toe curls, daily during breaks to support muscle pump function and fluid removal. Shift weight frequently while

standing and avoid sitting with legs hanging for long durations, avoid static postures. Educating about wearing compression garment grade 2 for varicose veins management. Consult your physician immediately if a new onset of swelling is noted that does not resolve in 1-2 days.

2. Complete Decongestive Therapy (CDT)

In the 1970s Hungarian physicians Michael and Ethel Földi incorporated the Vodders' MLD technique into a comprehensive lymphedema treatment program now called complete decongestive therapy (CDT). Current recommended course of care is a 2-phase program of complete decongestive therapy (CDT)

Table 6: CDT Phase I & Phase II

Phase I (Intensive) 4-6 weeks	Phase II (Self-Management)
Skin care	Skin care
Manual lymph drainage (MLD)	Compression garment during the day
Lymphedema Bandaging	Exercises - ROM and strengthening
Exercises -ROM and strengthening	Bandaging at night
Compression garment at end of phase I	Manual lymph drainage (MLD) as needed

3. Intermittent Pneumatic Compression (IPC)

Newer programmable, multi chamber devices have improved design. IPC may move fluid without adequately removing proteins, deliver higher-than-intended pressures that could damage lymphatic vessels. when used alone, shift oedema proximally, increasing the risk of genital lymphedema. However, some studies report beneficial outcomes when IPC is used alone more commonly, as an adjunct to conservative therapy.

4. Manual Lymph Drainage

Manual lymph drainage (MLD) is a gentle hands-on therapy that improves lymphatic drainage by stimulating the lymphatic system. It enhances lymph flow, redirects lymph around blocked areas, and increases lymphatic vessel contractions to promote fluid transport. MLD is most effective when the patient is in a supine position with the affected limb elevated. Proper knowledge of lymphatic anatomy and MLD stroke techniques is essential for effective treatment.

5. Bandaging

External compression is a fundamental component of Complete Decongestive Therapy (CDT) and is essential for maintaining the reduction in lymphedema achieved through Manual Lymph Drainage (MLD). Compression should be applied immediately after MLD, as MLD alone is unlikely to produce lasting improvements. During Phase I, multilayer compression bandages are primarily used, while Phase II typically involves daytime compression garments and nighttime bandaging. Compression works by increasing tissue pressure, reducing fluid filtration into the interstitial space, and promoting fluid reabsorption into the venous and lymphatic systems. It should be applied using the principle of graded compression, with higher pressure distally and lower pressure

proximally to enhance lymphatic and venous return. Compression also improves the efficiency of the muscle pump during movement and provides support to tissues that have lost elasticity. Additionally, it helps soften fibrotic tissues seen in advanced lymphedema.

6. Short Stretch

Short-stretch compression bandages are the preferred choice for lymphedema management because they provide effective compression with lower resting pressure and higher working pressure during muscle activity. Unlike elastic long-stretch (Ace) bandages, they allow normal lymphatic and venous flow at rest while enhancing fluid movement during movement. They are made of latex-free textile material and stretch about 60% beyond their original length. These bandages should be applied using a graded compression technique. Proper application helps improve lymphatic drainage and prevents damage to superficial vessels. During Phase II of Complete Decongestive Therapy (CDT), compression garments are worn during the day to maintain the reduction in limb volume achieved during Phase I, while short-stretch bandages or adjustable compression devices are used at night. Proper fitting of compression garments by trained professionals is essential to ensure effective treatment. Garments should be replaced regularly, usually every six months, as they lose their compressive properties over time. Nighttime compression with bandages or adjustable devices helps maintain oedema reduction and supports long-term lymphedema management.

7. ROM & Strength Exercise

Rationale: Working pressure > resting pressure

Hence helps in drainage of lymphatic fluid

Combining with the strengthening of lower limb With TheraBand.

Table 7: Rom & Strengthening Exercise for Leg

Exercise	How to Perform	Duration
Ankle Pumps	Lie on your back or sit with your legs extended. Move your ankle by pointing your toes away (plantarflexion) and then pull them toward you (dorsiflexion) in a slow, controlled manner.	10 reps x 3 sets
Heel Slides	Lie on your back with your legs straight. Slowly slide your heel toward your buttocks by bending the knee, then return the leg to the starting position.	10 reps x 3 sets
Static Quads	Place a rolled towel under your knee while lying on your back. Tighten the thigh	10 reps x 3 sets

	muscle and lift your heel to straighten the knee without lifting the thigh.	with 10 sec hold
Heel Raises	Stand holding a stable support for balance. Rise up onto your toes, hold briefly, and then slowly lower your heels back to the floor.	10 reps x 3 sets
Leg Raises	Lie on your back with one knee bent and the other leg straight. Tighten the thigh muscle of the straight leg and lift it about 30–45 cm, then lower it slowly.	10 reps x 3 sets
Ankle Dorsiflexors Strengthening	Secure a resistance band around the forefoot and anchor the other end. Pull your foot upward toward your shin against the resistance, then slowly return.	10 reps x 3 sets
Ankle Plantarflexors Strengthening	Attach a resistance band to the forefoot and hold the other end firmly. Push your foot downward against the band, then slowly return to the starting position.	10 reps x 3 sets
Ankle Invertors Strengthening	Secure a resistance band to the outside of your foot. Turn the sole of your foot inward against the resistance, then slowly return to neutral.	10 reps x 3 sets
Ankle Evertors Strengthening	Secure a resistance band to the inside of your foot. Turn the sole of your foot outward against the resistance, then slowly return to the starting position.	10 reps x 3 sets

8. Improve Flexibility

Table 8: Stretching Exercise

Flexibility	How to Perform	Duration
Hamstring Stretch	Lie on your back and lift one leg while keeping the knee straight. Hold the back of your thigh or use a towel around the foot to gently pull the leg toward your chest until a stretch is felt behind the thigh.	30 Sec Hold x 3 reps
Heel Slides	Assume a half-kneeling position with one knee on the floor and the other foot placed in front. Keeping your trunk upright, gently shift your weight forward until a stretch is felt in the front of the hip of the kneeling leg. Hold the stretch and return to the starting position.	30 Sec Hold x 3 reps

9. Elevation

Elevation is an important supportive intervention in the management of lymphedema, particularly when combined with Complete Decongestive Therapy (CDT). Elevating the affected limb above the level of the heart uses gravity to facilitate venous and lymphatic drainage, thereby reducing fluid accumulation and limb swelling. It helps decrease hydrostatic pressure, relieves limb heaviness, discomfort, and fatigue, and may improve patient comfort during rest. Elevation is especially beneficial after Manual Lymph Drainage (MLD) and during periods of inactivity or sleep. However, elevation alone is not sufficient to reduce chronic lymphedema because protein-rich lymphatic fluid cannot be

effectively drained by gravity alone. Therefore, it should always be combined with compression therapy, therapeutic exercises, and proper skin care as part of a comprehensive lymphedema management program to achieve optimal outcomes.

The other treatments that can be used in ENV are skin debridement and managing the underlying disease. In the literature, they related the following to managing ENV:

1. Hyperkeratosis is treated locally using 5% salicylic ointment.
2. Antifungal drugs are applied locally in cases of fungal infection but for a short time.

Table 9: FITT Recommendations for Individuals with Overweight & Obesity

Fitt	Fitt recommendations for individuals with overweight and obesity		
	Aerobic	Resistance	Flexibility
Frequency	≥ 5 Days/Week	2-3 Days/Week	Every day before exercise
Intensity	Initial Intensity should be moderate (40%-59% HRR); progress to vigorous (≥ 60%) for greater health benefits.	(60%-70% of 1-RM: gradually increase to enhance strength and muscle mass.	Stretch to the point of feeling tightness or slight discomfort
Time	30-40 min/day (150 min/week)	3 sets of 10 repetitions for each of the major muscle group	Hold static stretch for 15-30 sec; 2-4 repetitions of each exercise
Type	Prolonged, rhythmic activities using large muscle groups (e.g. Walking, Cycling, Swimming)	Resistance machines, Free Weights, Theraband, Weightlifting	Static and mechanical stretching PNF
1 RM - one repetition maximum; HRR - heart rate reserve, PNF - proprioceptive neuromuscular facilitation			

Discussion

Lower-limb lymphedema is a chronic condition that causes persistent edema, tissue fibrosis, recurrent infections, and functional limitations due to impaired lymphatic drainage. In the present case, a comprehensive physiotherapy program based on Complete Decongestive Therapy (CDT) resulted in approximately 25% reduction in limb volume, improved muscle strength, enhanced functional exercise capacity (6MWD: 212.8 m to 310 m), and better gait performance. These findings are consistent with the International Society of Lymphology (ISL) recommendations, which identify CDT as the gold-standard conservative treatment for

reducing oedema, improving lymphatic drainage, and preventing disease progression.^[1]

Compression therapy and manual lymph drainage were key components contributing to oedema reduction by enhancing lymphatic and venous return, while therapeutic exercises improved the calf muscle pump, muscle strength, and functional mobility without worsening swelling. Previous studies have also demonstrated that combining compression therapy with exercise produces greater improvements in limb function and physical performance than either intervention alone.^[3,4]

Patient education regarding skin care, compression garment adherence, limb elevation, and infection prevention was essential for long-term management. The patient's previous discontinuation of compression stockings may have contributed to recurrence, emphasizing the importance of lifelong self-management. Although this report represents a single case, it supports existing evidence that individualized physiotherapy centered on CDT can effectively improve clinical and functional outcomes in chronic lower-limb lymphedema.^[5]

Conclusion

This case report demonstrates that a comprehensive physiotherapy program incorporating Complete Decongestive Therapy, manual lymph drainage, multilayer short-stretch compression bandaging, therapeutic exercises, skin care, and patient education can substantially improve clinical outcomes in chronic lower-limb lymphedema. The intervention resulted in reduced limb edema, improved functional exercise capacity, enhanced muscle strength, and better mobility while promoting effective self-management. Early diagnosis, regular physiotherapy, and long-term adherence to compression therapy remain essential for preventing disease progression, minimizing recurrent infections, and improving overall functional independence and quality of life.

Declaration by Authors

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