



Case Report

Physical therapy in post-thrombotic syndrome: A case report

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ABSTRACT

Post-thrombotic syndrome (PTS) is a chronic venous insufficiency (CVI) associated with leg pain, swelling, feeling of heaviness, edema, and skin changes secondary to prior deep vein thrombosis (DVT) within 1st–2 years. It occurs in 20–50% of DVT, usually caused either by residual venous obstruction, valvular failure, or both and attributed to ambulatory venous hypertension. Treatment options for PTS are limited, but most clinicians dwell on preventive measures, using compression stockings and strengthening exercises to improve the pump action of the calf muscle. A 30-year-old married female civil servant was diagnosed with PTS following treated lower limbs DVT; she presented with bilateral lower limbs edema, moderate pain, weakness of the lower limb group of muscles, and a Vilalta score of 9 out of 15. After physiotherapy sessions inform of resistance strengthening exercises, ankle pump exercises, effleurage soft-tissue manipulation, treadmill training, and using compression stockings at most day hours (4–8 h) while elevating the lower limbs in night hours for 8 weeks on alternate days visit. Pain reduced, muscle power for the lower limbs improved, edema reduced in centimeters, and Vilalta score dropped to five out of 15. This study gives an insight into employing different physical techniques that have the potential to improve clinical outcomes of PTS because it reduces Vilalta score significantly, and edema, in particular decreases in centimeters throughout the study. As such, physical therapy means such as compression stocking, goal-oriented strengthening, aerobic exercises, and effleurage soft-tissue manipulation can be considered in the management of patients with PTS.

Keywords: Post-thrombotic syndrome, Strengthening, Stockings, Manipulation, Exercises

INTRODUCTION

Post-thrombotic syndrome (PTS) is a chronic venous insufficiency (CVI) associated with leg pain, swelling, feeling of heaviness, edema, and skin changes secondary to prior deep vein thrombosis (DVT) within 1st–2 years.^[1,2] It occurs in 20–50% of DVT, usually caused either by residual venous obstruction, valvular failure, or both and attributed to ambulatory venous hypertension.^[1] Ambulatory venous hypertension results in reduced calf muscle perfusion and increased tissue permeability, which leads to chronic edema, progressive calf pump dysfunction, and, ultimately, skin ulceration.^[3]

There are some risk factors related to PTS, which include residual symptoms of DVT a month after proper treatment, recurrent DVT, obesity, and old age.^[4] Women are more likely to develop DVT during pregnancy than when not pregnant because pregnancy will likely predispose them to develop PTS due to physiological changes associated with it and also the risk of having all components of Virchow's triad: Venous stasis, endothelial damage, and hypercoagulability.^[5]

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There are limited and controversial treatment options for PTS as most clinicians dwell on preventive measures; as the promising option, curiously complex lymphedema therapy (CLT) is believed to have the potential to improve PTS outcome in the same vein that it improves lymphatic flow in the clinical trial of using CLT. In addition, using compression stocking therapy of pressure 20–40 mmHg appeared safe, well-tolerated, and effective in reducing symptoms, thereby improving quality of life.^[6]

PTS is the main determinant of quality of life (QOL) after DVT, and its adverse impact on QOL increases with increasing PTS severity.^[7] QOL of patients with severe PTS was reported to be impaired to a degree similar to that of persons with severe chronic diseases such as cancer, angina, and congestive heart failure.^[8]

Exercise training is an effective treatment for arterial claudication and also improves post-thrombotic syndrome. It has potential mechanisms to improve clinical outcomes of patients battling with PTS, which include improved strength, reduced swelling, and discomfort through improvement of calf muscle pump action and musculoskeletal function through increased flexibility of ankle and knee joints.^[8,9]

Even though a strong research study population is needed for the effectiveness of using both compression stocking and CLT in the management of PTS, there are still some options that may improve the clinical outcomes in patients with PTS; this case report reveals the benefit of using different physical means in the management of PTS.

CASE REPORT

A 30-year-old married social worker was said to be doing well until 3 years ago when she started having bilateral lower limb swelling in 2nd trimester of gestational age; the swelling kept increasing spontaneously, which made her report to an antenatal clinic where she was treated as pregnancy-induced edema. After delivery, the edema reduced insignificantly but did not limit activities of daily living. Eighteen months later, edema reappeared while in 1st trimester of the second pregnancy. Meanwhile, after delivery, the swelling persisted, and then reported to a private Hospital in Kaduna State, Nigeria, which was later referred Abubakar Tafawa Balewa University Teaching Hospital Bauchi (ATBUTH) due to proximity. The patient was diagnosed with DVT, managed, and discharged at ATBUTH accordingly. However, a year after discharge, the patient reported with complaints of persistent edema of both lower limbs but no skin rashes or ulceration, as shown in Figure 1. Following relevant screening and assessments, she was diagnosed with post-thrombotic syndrome and then referred to the physical therapy department for co-management. On examination, there was pain at both ankle joints in dorsiflexion and plantarflexion



Figure 1: Pedal edema of both lower limbs for 30-year-old woman that reported with complain of persistent edema of both lower limb but nor skin rashes neither ulceration.

but free at knee and hip joints, no skin discoloration, rashes, or ulceration.

Bilateral leg and pedal edema of the right and left lower limb [Table 1] and pain of 4/10 on numeric pain rating scale (NPRS), intact sensation, negative Homan's sign with Vilalta score of 9, and Doppler ultrasonography revealed normal study. The patient received physiotherapy intervention information on effleurage soft-tissue manipulation with topic analgesic gel to lower limbs, strengthening exercise to lower limb group of muscles, active ankle pump exercises 20 repetitions/sets for 5 sets/session and 3 times/day, therapeutic positioning by elevating lower limbs to 30° of inclination for an average of 8 h a day, mostly at night and minimizing putting lower limbs on the ground while on the chair to reduce the effect of gravity, tiptoeing (heel up) exercises 20 repetitions for 5 sets/sessions and at least 3 times/day, and application of compressive stockinette for 3 h every day (there is warm up before main exercise at the hospital- and home-based program which includes stretching of calf and hamstrings muscles and also aerobics in the form of step-up exercise). After 4 weeks of treatment sessions, pain reduced to 2/10 on NPRS, Vilalta score improved to seven out of 15, and edema decreased, as shown in Table 1. Later, treadmill training was introduced with a warm-up and cool-down period at the rate of 1 km/h for a minute each and 3.0 km/h for 5 min as the main exercise regimen. Improvised pressure-graded compression using elastic bandage (using crepe elastic bandage, Brand; Wumix Mall) and Electric Compressive device (North American Wellness Air Compression Leg wraps with handheld control; Jobar Brand). Following another 4 weeks (8th week of treatment) of treatment sessions on alternate days, Vilalta's score dropped to five out of 15, and edema reduced by centimeters, as shown in Table 1. Muscle power for each compartment of the lower limbs improved to a level against gravity and moderate

Table 1: Edema measurement by taking the circumference of the ankle and foot.

Region	Right lower limb			Left lower limb		
	Pre-intervention	4 th week	8 th week	Pre-intervention	4 th week	8 th week
Ankle circumference in cm	34 cm	32 cm	30 cm	32 cm	29 cm	27 cm
Foot circumference in cm	25 cm	24 cm	21 cm	23 cm	23 cm	20 cm

Reference points at ankles are medial and lateral malleoli points, while at feet, they were 5 cm away from mid-toe

resistance. The patient was then placed on recurrent application of compression stocking, strengthening exercises, and ones in 2 weeks visit for follow-up.

DISCUSSION

This report shows the effectiveness of adopting multiple physical therapy approaches in the management of PTS. Basically, Vilalta's score of PTS, pain, and edema reduced appreciably after 4 weeks of physical therapy sessions before introducing treadmill training. Then, subsequently, an improvised compressive stocking was introduced using an elastic bandage to increase the time of application, and in the end, Vilalta score, edema, and pain reduced significantly. We have not seen any study that focuses on the role of physical therapy in the management of PTS, but some literature has shown the effectiveness of some domains used by physical therapists, such as exercise training (such as ankle pump exercise, stepper, and treadmill training) and compression stocking.^[6,4,10] This study gives an insight into possible positive outcomes of physical therapist treatment options in the management of PTS, and it might not be limited to management only but preventive measures and improving the physical fitness and functional capacity of an individual battling with PTS. Even though there are controversies in relation to using compression elastic stocking (CES) as the mainstay management of PTS, some researches show the effectiveness of CES and CLT that improves lymphatic flow and may have the potential to improve PTS and prevent reoccurrence.^[6] In 12 weeks, the treatment duration proved the efficacy of CES and CLT, which is in line with our findings following 8 weeks of treatment sessions where clinical improvement was achieved.^[6]

There is a lack of obvious evidence for the care of PTS due to limited literature to support the effectiveness of treatment options such as elevation, stocking, medicated bandages, and strengthening exercises to the lower limb group of muscles, though exercises training has revealed significant clinical outcomes of PTS despite consistency needed from the participant.^[4,11] The inclusion of strengthening exercises in this study might give the patient more advantage to having improved pump action of muscles, thereby reducing the edema. In addition, Padberg *et al.* reported that calf muscle pump function and dynamic calf muscle strength

were improved following 6-month structured strengthening exercise in patients with CVI, which is one of the reasons for the occurrence of PTS.^[6,12]

The strength of this study will be the holistic approach employed in the management of this patient, which includes soft-tissue manipulation, application of compressive stocking, strengthening, and aerobic exercise. Even though there is research that shows the clinical and statistically significant outcomes following a two-center randomized control trial of exercises program in patients with PTS.^[4] However, a recent systematic review revealed insufficient facts on using exercises for the management of PTS due to uncertain effectiveness and unclear evidence of the exercise therapy alone, despite the fact that exercise is reported as an inadequate treatment option but can be a cofactor when in cooperation with other means of management like in this study where exercise is included.^[13]

The limitation of this study includes that it is a single case report design, not a case series nor a randomized trial with a large sample size to ascertain the statistical significance of physical therapy techniques in the management of PTS. Furthermore, the history of taking any medication before the first physical therapy contact was not disclosed by the patient, but was not on any medication throughout the period of the study.

CONCLUSION

This study gives insight into employing different physical techniques that have the potential to improve clinical outcomes of PTS because it reduces Vilalta score significantly and edema decreases in centimeters throughout the study. As such, physical therapy means such as compression stocking, goal-oriented strengthening aerobic exercises, and effleurage soft-tissue manipulation can be considered in the management of figure patients with PTS.

Ethical approval

The Institutional Review Board approval is not required.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

REFERENCES

- Makedonov I, Kahn SR, Galanaud JP. Prevention and management of the post-thrombotic syndrome. *J Clin Med* 2020;9:923.
- Kahn SR. The post-thrombotic syndrome. *Hematology Am Soc Hematol Educ Program* 2016;2016:413-8.
- Kurstjens RL, de Wolf MA, Konijn HW, Toonder IM, Nelemans PJ, de Graaf R, *et al.* Intravenous pressure changes in patients with postthrombotic deep venous obstruction: Results using a treadmill stress test. *J Thromb Haemost* 2016;14:1163-70.
- Kahn SR, Shrier I, Shapiro S, Houweling AH, Hirsch AM, Reid RD, *et al.* Six-month exercise training program to treat post-thrombotic syndrome: A randomized controlled two-centre trial. *CMAJ* 2011;183:37-44.
- James AH, Jamison MG, Brancazio LR, Myers ER. Venous thromboembolism during pregnancy and the postpartum period: Incidence, risk factors, and mortality. *Am J Obstet Gynecol* 2006;194:1311-5.
- Holmes CE, Bambace NM, Lewis P, Callas PW, Cushman M. Efficacy of a short course of complex lymphedema therapy or graduated compression stocking therapy in the treatment of post-thrombotic syndrome. *Vasc Med* 2014;19:42-8.
- Lubberts B, Pereira NR, Kabrhel C, Kuter DJ, DiGiovanni CW. What is the effect of venous thromboembolism and related complications on patient reported health-related quality of life? *Thromb Haemost* 2016;116:417-31.
- Kahn SR, Shbaklo H, Lamping DL, Holcroft CA, Shrier I, Miron MJ, *et al.* Determinants of health-related quality of life during the 2 years following deep vein thrombosis. *J Thromb Haemost* 2008;6:1105-12.
- Yang D, Vandongen YK, Stacey MC. Effect of exercise on calf muscle pump function in patients with chronic venous disease. *J Br Surg* 1999;86:338-41.
- Kahn SR. The post-thrombotic syndrome. *Hematology Am Soc Hematol Educ Program* 2010;2010:216-20.
- Mosti G, Picerni P, Partsch H. Compression stockings with moderate pressure are able to reduce chronic leg oedema. *Phlebology* 2012;27:289-96.
- Padberg FT Jr., Johnston MV, Sisto SA. Structured exercise improves calf muscle pump function in chronic venous insufficiency: A randomized trial. *J Vasc Surg* 2004;39:79-87.
- Jasionowska S, Turner BR, Machin M, Onida S, Gwozdz AM, Shalhoub J, *et al.* Systematic review of exercise therapy in the management of post-thrombotic syndrome. *Phlebology* 2022;37:695-700.

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