
INVITED LECTURE

**LYMPHEDEMA IN CHRONIC VENOUS INSUFFICIENCY
AND PHYSICAL PROCEDURES**

ABSTRACT**Senija KURALIĆ¹**
Nedima KAPIDŽIĆ-BAŠIĆ²¹*Dermatological Clinic*²*Clinic for physical medicine and
rehabilitation*^{1,2}*School of Medicine,
University in Tuzla**University Clinical Center Tuzla,
Tuzla, Bosnia and Herzegovina*

Lymphedema is difficult, chronic, progressive, and prolonged illness with an uncertain therapeutic outcome. Lymphedema in chronic venous insufficiency (CVI), is by its etiology a secondary illness, resulting from the dysfunction of the lymphatic and depending on the degree of CVI. This lymphedema can be transitory or persistent, acute or chronic with or without pathological changes in skin. CVI lymphedema occurs as a result of venous hypertension i.e. pathological reflux of venous blood and an increase in the mean capillary pressure in microcirculation of skin venules, which causes the venous route. The venous route impedes lymph reabsorption which upon the exhaustion of compensatory mechanisms leads to the lymph route and the occurrence of clinical lymphedema.

Lymphedema therapy in CVI is directly dependent on the treatment of CVI, but to date these disorders are treated but not cured and it is correct to talk about treatment or help. Physical treatments include the application of: physical procedures such as vacusac, vasculator, magnetic, electrical, dosed kinezitherapy, laser, hyperbaric oxygen therapy (HBOT), thermo-mineral water of indifferent water temperature. Physical therapy contributes to the improvement and development of collateral flow and improved venous drainage with venous insufficiency. Clinically there is decrease in edema, improved trophic, reduced hyperpigmentation, reductions in dermatoflebosclerotic changes, reduced pain which ultimately improves the quality of life of these patients.

Keywords: *lymphedema, chronic venous insufficiency, physical procedures*

INTRODUCTION

Lymphedema is a clinical condition caused as a result of stagnation of interstitial fluid due to its inability to discharge, with normal or increased production. Research definition of lymphedema includes an increase of more than 10% of the volume of the extremities in comparison to the situation before the illness.¹ There are many factors that can lead to lymphedema, mainly the effect of several of them hence their overlapping and cumulative effects makes it difficult to diagnose the main cause. The cause of obstruction and lim-

phostasis is known in secondary lymphedema, nit not clear or unknown in primary lymphedema.²

Etiology and pathogenesis of lymphedema are the subject of much research, although research is motivated by other reasons, in particular, investigations of malignant diseases have yielded significant results.

There are many classifications of lymphedema. The simplest is the etiological according to Telford and Simmons (1938).^{3,4} However, it seems that the Kinmonth classification of primary and secondary lymphedema in the most clinically acceptable.⁵ Primary lymphedema can be hereditary and sporadic. Kinmonth division of primary lymphedema according to the time reporting on "congenita" (up to 2 years of age), "praecox" (up

to 35 years old) and "tarda", when lymphedema occurs in persons over 35 years of age. In essence, the development of lymphedema is helped by swelling that lasts long enough and may be cardiac, nephrologic, enteral, endocrine, rheumatic, circulatory or some other etiology.⁶

International classification of chronic lymphedema:

- Stage I – early accumulation of fluids rich in protein, during the elevation of extremities the swelling subsides (reversible) and the affected area is close to normal size and shape.
- Stage II – the swelling subsides during elevation of extremities, the swelling is pasted, pressure by finger leaves a dent, but due to fibrosis finger pressure does not form a dent.

Stage III – The swelling is spongy with present trophic skin changes (fat deposits, wart-condyloma, acanthosis pigmentation) loss of limb function, end state is elephantiasis.

Clinical lymphedema is characterized by: progressive painless swelling of the extremities, not pasted swelling that spreads bottom-up, a feeling of fullness and added weight, reduced range of motion in joints, hyperkeratosis, skin and rhagas, onichomycosis, tingling sensation, itching and pain of varying intensity, dorsas swelling as "buffalo hump" and-Stemmer's sign (square foot toes). With repeated infection episodes, with episodes of cellulitis or lymphangitis, skin thickening, hardening of the extremities, lymph leakage (limphorrhea), the constant increase of the swelling, limb deformities occur-elephantiasis. Lymphedema is a chronic condition that can be kept under control through therapeutic procedures.⁷

Chronic venous disease with chronic venous insufficiency (CVI), represents a major medical problem in the clinical practice, because the progression of changes can lead to disability thus creating socioeconomic difficulties.^{7,8} Venous insufficiency occurs due to obstruction of veins and / or a valve failure. Diseases of the venous system with valve damage of deep, superficial and communicating veins with or without venous obstruction according to the CEAP classification, the clinical manifestations is graded from 0 to 6 as follows.⁹

Lymphedema is an integral part of the pathology and clinical features of CVI, and an indicator of the degree and extent of venous congestion. Edema represents a hemodynamic milestone towards the terminal stage of the disease (lipodermatosclerosis and ulceration). The stasis makes reabsorption of lymphoma more difficult, which following the exhaustion of compensatory mechanisms of the lymphatic system (lymphatic collateral circulation, limpho-venous fistulas, reduction in macrophage activity), leads to retention of lymphatic fluid in the interstitial region and the clinical occurrence of lymphedema.¹⁰

Upon its formation, in CVI, lymphedema is secondary and depending on the degree of CVI can be transitory or persistent, acute or chronic, or inflammatory or infective, with or without specific pathological skin changes. In CVI, due to primary varicosities but without damage to deep veins, lymphedema is unilateral, localized in the distal extremities (ankles), transitory, retreats following elevation of the extremities, lymph index is 10-15% at most, flexibility and quality of the skin are preserved, but with the emergence teleangiectasia (corona phlebectatica) and sporadic petechiae. Ultrasound suggests weak cellular infiltration of subcutis and prefascial edem.

In post-thrombotic CVI, lymphedema exists in 75% of patients, predominantly below knees, mostly on the left side and chronic, persistent, with small day-night variations in size, but never completely withdrawn. Lymph index is over 25%. The skin texture is altered, with increased thickness, decreased elasticity. The anatomical foot shape is modified due to the fibrosclerosis of subcutaneous tissue. Polymorphic efflorescence is visible on the skin: erythema, purpura, hyperpigmentation, vesicles, nodules, expressed skin folds, fissures, limphorrhea, micro-ulcers. Cellulitis, erysipelas and lymphangitis are infectious complications in one quarter of patients, while fungal infection of skin and nails occur in 5% of patients.

Patients with lymphedema of venous origin have a significantly altered quality of life, because: their movement is more difficult and restricted, there is greater difficulty to find clothes and shoes as well as a cosmetic problem. In addition, patients require constant medical care with frequent hospitalization, material costs are high and despite this there are frequent episodes of infection and worsening of edema.¹¹

Diagnosis is based on history, clinical feature, while diagnostic procedure includes ultrasound of skin and tissue, vascular echosonography, lymphoscintigraphy, magnetic resonances, biopsy of lymphedematous tissue, genetic research (used more in primary lymphedema), but the experience of the doctor is of considerable importance for the correct diagnosis. The following is important for diagnosis: time of appearance and duration of lymphedema, symptoms with patients, appearance, distribution, consistency of (lymph)edema, skin lesions, form and frequency of lymphedema, complications etc. In fact, the diagnostic methods are utilized to determine the cause of lymphedema rather than diagnosis itself. They are used for differential diagnosis and monitoring of lymphedema reduction.

Differential diagnostic problems of lymphedema in CVI can include: lipedema, primary lymphedema, obesity, congenital malformations of veins, Angiomatosis Kaposi, post-traumatic lymphedema, extensive hematomas, Baker's cysts, spontaneous rupture of gastroc-

nemius, malignant diseases, arthropathy, etc.

THE GOALS OF TREATMENT

- Education of patients, families and, if possible, friends about lymphedema,
- Stimulation of the lymphatic system, facilitation of lymph flow,
- Prevention of subsequent accumulation of swelling,
- Prevention of repetition or recurrence of infection,
- Help the patient to cope psychologically with the sequels of lymphedema,

Lymphedema is "about managing the disease rather than curing it" thus it is perhaps more correct to talk about the management of lymphedema or help with lymphedema, rather than curing the disease. Treatment methods can be divided into conservative (nonoperative) and surgical (operative) methods, but the division is didactic and conditional as therapeutic procedures usually involve several different combinations.¹² Since 1995, the International Society for Lymphology (ISL) publishes Consensus documents for the diagnosis and treatment of lymphedema.¹³

A) Conservative (non-operative) methods of treatment of lymphedema include medical and physical therapy and have proven to be successful in the first and second phase of lymphedema, while no significant effects are noted in the third phase. The main issue with the medical therapy is that it is often applied to do doctor's inability to provide an alternative approach or ignorance, and the aggressive campaign of pharmaceutical companies. In chronic lymphedema this treatment can have only psychological effects.¹¹ In the United States, this treatment is applied under strictly controlled conditions. Specific drugs used in the treatment of lymphedema can be split into three groups: benzopyrone (coumarin), flavonoids. Complex Decongestive Physical Therapy (CDT) is the most widely accepted therapy today, and includes three phases.

Phase 1 or decongestive (acute) phase includes: treatment, informing and training patients (drug therapy, precautions, hygienic-dietary regimen, contraindications, complications, bandaging, skin care, manual drainage, medical compression (bandaging), elevation of extremities, exercise with and without compression, dietary programs for weight loss. Physical procedures in this phase can include: ultrasound, laser, cooling, pneumatic compression pumps, treatment in the hyperbaric chambers, and psychiatric treatment as needed. This phase usually lasts 4-6 weeks, or to reduce the extent of variation to 3cm with healthy limbs. In fact, complex decongestive physical therapy involves the application of exercise, manual lymph drainage (MLD), compression therapy and skin care.

Phase 2, or rehabilitation (preservation) phase begins after reaching "decongestion plateau" and consists of a daily compression bandages and intensive "home program" in the form of personal MLD (twice daily) and day-long wear of elastic compressive socks. Phase 3 is the repetition of phase 1 after 6 months or due to the worsening of the disease. The main issue with the physical procedures is that it extrudes only water from edema and not the proteins that are the main problem. Furthermore, it does not solve the already developed fibrosis.

Other physical procedures in the treatment of lymphedema include:

Mechanotherapy: (VACUSAC computerized system that has three main programs within which a number of combinations of reduced atmospheric pressure and massages of different intensities can be programmed (a total of 350 combinations are possible with this VASKULATOR computerized apparatus that allows the effect of pressure and subpressure on the limbs placed in cylinders, of certain rhythm and duration by exact computerized schemes depending on the stage of ischemia. It also includes indirect application of heat, ultraviolet light, ozone or carbon dioxide in the cylinders. Kinesiology is an obligatory therapeutic measure in the treatment of vascular patients. In chronic venous blockages, synergistic contractions of muscle groups of individual segments by the activation of plantar, popliteal, sciatic muscle pump by active exercises and using dynamic devices (ergo-bicycle, functional machines) by increasing the pressure within the fascial layers, enhances the movement of venous blood towards the heart and emptying of inter and intra-muscular veins. Transport of venous blood can be helped by a range of passive and active procedures: graduated elastic bandage, avoiding passive standing and sitting, frequent elevation of the lower extremities during the day, walking, elevation the legs during sleep.

Electrotherapeutic procedures in the treatment of vascular patients include the use of unidirectional and alternating currents (low, medium and high frequency in strictly controlled indications).

Magnetic therapy uses high-pulse electromagnetic field (160-640Hz) and low frequency (10 or 50Hz) for 30 min. in a series of 20 sessions. Acting in different mechanisms, it alters the permeability of cell membranes and affects the movement of ions, ion pump, and thus affects the process of diffusion and active transport through the membrane, increasing the partial pressure of oxygen, facilitates its diffusion and utilization in cells, enhances the energy balance of the cell and activates the enzyme system. Acts as analgesic, anti-inflammatory, antiedematous, stimulates tissue regeneration and accelerates the healing of ulcers.

Laser therapy stimulates the microcirculation

and cellular metabolism, and by causing arteriolar dilation it aims to improve the local metabolism through increased utilization of nutritive substances and oxygen and the accelerated elimination of degradable substances. It is biostimulative, antiedematous, anti-inflammatory and as an analgesic. Bioptron lamp emits polarized, polychromatic light that stimulates the biological processes in the body which leads to faster tissue regeneration. Balneotherapy has a thermal, mechanical and chemical effects. Apply water of indifferent temperature.

Hyperbaric oxygen (HBO) is a therapeutic method that provides the use of oxygen as a drug under certain conditions. The first and most significant effect of HBO is the oxygenation of tissue that leads to the stimulation of proliferation, angiogenesis, which leads primarily to increased blood flow to affected tissue.

B) surgical methods: today about 100 types of surgery are used but they did not produce the expected results

PREVENTION

Prevention of lymphedema is of particular importance because lymphedema is a difficult, chronic, long-term, progressive and incurable disease. Success in preventing (prevention or prolongation of occurrence, easing the intensity of symptoms) significantly improves the quality of life of these patients.

Prevention of primary lymphedema is difficult. Prevention of secondary lymphedema in CVI includes prevention and timely treatment of vein diseases. Precautions and care of the extremities in order to prevent the occurrence or slowing of the progression of lymphedema is very complex and includes: measures to prevent injury, start and development of infection, exposure to elevated temperature and pressure. Skin hygiene must be daily because it helps preserve skin elasticity and resistance to everyday trivial injuries and irritants. Nail care is also important because they are usually "front door" of infection. It is not recommended to have pests (due to irritation and scratches) and habitation in areas with lots of insects. The diseased or at-risk limb it is prohibited to: give injections and vaccines, collect blood, lymphography, acupuncture, extract fluids, expose to elevated temperature (UV, tanning, sauna), shaving and waxing services, which cause skin irritation, intensive massage techniques, all means of increasing the pressure (tight clothing and footwear, sleeping on the affected side, long forced positions such as airplane flight).

CONCLUSION

Lymphedema is a chronic, hard, progressive, long term and terminal illness. The application of operative and

non-operative treatments of varices, especially use of graduated compression bandages, prevention of venous thrombosis and infectious complications, medical and physiatric treatment can reduce the incidence of secondary lymphedema. It is important to note that it takes about 10 years on average to progress from the acute, transitory to chronic swelling, so this time should be used for the application of secondary prevention measures. Combined (complex) decongestive physiotherapy of lymphedema is still the most acceptable method of treatment of lymphedema of the extremities and can be considered, the 'gold standard'. Surgical therapy is reserved for the most serious forms of the disease or only as a supplement to physical therapy.

REFERENCES

1. Olszewski WL. Aspects of lymphatic biology and disease: De novo lymph node formation in chronic inflammation of the human leg. In: Rockson SG, editor. The lymphatic continuum: Lymphatic biology and disease. Ann NY Acad Sci 2002; 979: 166-177.
2. Hussain SA. Chronic inflammatory reaction in lymphedema. Phlebology 2000; (28): 249
3. Browse NL, Stewart G. Lymphedema: Pathophysiology and classification. J Cardiovasc Surg 1985; 26: 91-106.
4. Stanley-Rockson G. Lymphedema. The American Journal of Medicine 2001; (110): 288-295.
5. Kinmonth JB, Taylor GW, Tracy GD, Marsh JD. Primary Lymphoedema. Clinical and lymphangiographic studies of a series of 107 patients in which the lower limbs were affected. B J Surg 1957; 45(189): 1-10.
6. Kinmonth JB. Primary lymphoedemas. Classifications and other studies based on oleolymphography and clinical features. XII congress of the European Society of cardiovascular surgery, London, July 13, 1968. II symposium: Investigative and surgery of lymphoedema (Excluding the treatment of cancer). J Cardiovasc Surg (Torino) 1968; (Spec Issue): 6577.
7. John W Ely, Jerome A. Approach to leg edema of unclear etiology. J Am Board Fam Med 2006; 19 (2) 148- 160.
8. Delić J. Limfedem u hroničnoj venskoj insuficijenciji. Zbornik radova Prvog kongresa flebologa Srbije sa međunarodnim učešćem, Beograd, 2007: 28-29.
9. John J Bergan. Severe chronic venous insufficiency: Primary treatment with sclerofoam. Vascular surgery 2005; 18 (19): 49-56.
10. Agus G.B., Allegra C., Antignani P.L., Guidelines for the diagnosis and therapy of the vein and lymphatic disorders, International Angiology; 2005. 24 (2).
11. Ignjatović M. Limfedem i njegovo lečenje. Knjiga radova I kongresa flebologa Srbije sa međunarodnim učešćem; Beograd, 2007: 25-27. 12.
12. Anonimus. The diagnosis and treatment of periferall lymphedema, Consensus document of the International Society of lymphology. Lymphology 2003; 36 (2): 84-91.13.
13. Ignjatović M, Maksimović Ž. Nacionalni Konsenzus dokument o dijagnostici i lečenju limfedema. <http://www.flebo.org.rs/nacionalni>