



The Quality of Life of Women After Treatment of Breast Cancer Is Lymphostasis As A Life-Changing Complication

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Introduction

According to the World Health Organization, over 10 million new cases of breast cancer are registered annually. Statistically, this disease ranks first among malignant diseases in women, accounting for up to 16% of all cancer types. For every 100 affected women, there is 1 man diagnosed with the disease. In Europe, more than 370,000 new cases are identified each year, resulting in approximately 130,000 deaths among women. The highest mortality rates from breast tumors have been recorded in the United Kingdom, Denmark, and France. Conversely, the lowest rates are observed among women in India, Ethiopia, China, and Mongolia.[1]

Breast Cancer in the Russian Federation (2023 Analysis)

Breast cancer is the absolute leader in oncological morbidity in Russia, accounting for 19.1% of all cases of malignant neoplasms. Five residents per 1,000 of the Russian population are diagnosed with this condition. In 2023, a total of 74,008 new cases were identified, categorized as follows: Stage I - 32.5%, Stage II - 42.7%, Stage III - 17%, and Stage IV - 7.4%.

Advances in Breast Cancer Treatment and Ongoing Challenges Science and medical professionals have made significant progress in the treatment of breast cancer at all stages. However, patients continue to face unresolved issues related to the consequences of surgical interventions. Various complications arise during the treatment process, and in this

article, we share our experience in addressing one such surgical complication: lymphedema.

Lymphedema (Lymphostasis) Lymphedema, also known as lymphostasis, is a chronic progressive condition characterized by the accumulation of protein-rich fluid in the interstitial space, associated with impaired lymphatic system function. This leads to chronic inflammatory processes, reactive fibrosis in the affected area, and excessive development of subcutaneous adipose tissue. According to current data, upper limb lymphedema occurs in approximately 40% of patients within 8 to 10 years following surgical treatment involving axillary lymphadenectomy. When this procedure is performed in conjunction with radiation therapy, the risk of developing lymphedema ranges from 22.5% to 60%. Currently, several options exist for the prevention and treatment of this complication.

Diagnosis of Lymphedema

Physical Examination

During the physical examination, the change in volume of the upper limb on the side of the surgical intervention involving lymphadenectomy is assessed in comparison to the healthy limb. The condition of the skin is also noted. In cases of progressive lymphedema, the swelling becomes persistent and firm; the skin in the affected areas darkens and exhibits significant peeling, leading to the formation of trophic ulcers.

Swelling: Increased swelling during physical activity and prolonged restriction of arm mobility occurs as the disease progresses, particularly in cases where the swelling does not subside after rest

Positive Stemmer's Sign: The inability to pinch the skin fold over the proximal phalanx of the fingers due to dense swelling or an increase in the skin fold is observed.

Positive Pitting Test: A visible deep indentation remains when pressure is applied to the tissues.

Measurement of Limb Circumference

The measurement of limb circumference is conducted at seven designated points

Wrist

Lower third of the forearm

Middle third of the forearm

Upper third of the forearm

Lower third of the upper arm

Middle third of the upper arm

Upper third of the upper arm

Instrumental Diagnosis

Ultrasound of the Soft Tissues of the Upper Limb: Assessment of fibrotic changes. Duplex Scanning of the Subclavian and Axillary Vessels: Evaluation of venous outflow status.

ICG Lymphography: Assessment of the transport function of the lymphatic system, determination of blockages, and development of collateral lymphatic flow. This method allows for the identification of preserved lymphatic pathways for the formation of lymphovenous anastomosis (LVA) and/or the determination of indications for lymph node transplantation.

MR Lymphography: This promising method provides high clarity and precision in visualizing deep lymphatic pathways, lymph nodes, and vessels. It also aids in assessing soft tissue condition, performing differential diagnosis between primary and secondary lymphedema, and determining indications for liposuction. These diagnostic methods enable the physician to accurately assess the patient's condition and select the most effective treatment.

Stages of Lymphedema

The stages of lymphedema are based on the methodology of ICG lymphography. The images obtained during ICG lymphography are classified into the following patterns:

Linear Type

Three Patterns of Dermal Backflow: (Splash, Diffuse, and Star Dust)

Additionally, ICG lymphography is classified into stages ranging from 0 to 5:

Stage 0: Characterized by a linear type pattern.

Stage 1: Characterized by a linear type pattern, but with visualization of contrast stagnation in certain areas of contrast injection.

Stage 2: Characterized by a linear type pattern, with contrast stagnation and retrograde dermal flow observed in some areas of contrast injection.

Stage 3: Characterized by diffuse distribution of contrast.

Stage 4: Total diffuse type of contrast distribution across the entire surface of the arm. Physiological lymphatic drainage pathways are not visualized. "Star Dust" is identified.

Stage 5: Contrast distribution above the injection site is not visualized.[2]

Treatment of Lymphedema

Conservative Treatment

The gold standard in the treatment of lymphedema is Complex Decongestive Therapy (CDT). This method comprises a comprehensive approach consisting of several key components and two phases of treatment.

Phase One: This phase involves multilayer bandaging and specialized exercises performed daily for a duration of four to six weeks[3]. The primary goal is to achieve maximum reduction in limb volume. It is essential to maintain skin care and perform Manual Lymphatic Drainage (MLD) throughout the treatment.

Phase Two: This phase focuses on maintenance and begins immediately after the completion of the first phase. The main objective is to preserve and optimize the results obtained during the initial phase. This phase includes the wearing of compression garments, continued exercise, skin care, and MLD as needed.

Components of Complex Decongestive Therapy (CDT) Manual Lymphatic Drainage (MLD)

MLD is a gentle, targeted massage technique that stimulates lymphatic flow without increasing blood circulation. It employs precise, light, smooth, slow, and rhythmic movements that are anatomically and physiologically directed towards the movement of lymphatic fluid. This technique helps improve lymph circulation and reduce swelling.

Primary Objectives

Increase the absorption of fluid and proteins from the interstitium by lymphatic capillaries

Enhance the contractility of lymphatic collectors.

Increase fluid absorption by lymph nodes.

These actions increase the volume of fluid that returns to the venous system via the lymphatic system. Research indicates that MLD is a safe treatment method. It contributes to better preservation of the effects of compression therapy, enhances

quality of life, and alleviates symptoms associated with lymphedema.[5-8]

Compression Therapy

Compression therapy is the primary method for treating lymphedema, both in the volume reduction phase and the maintenance phase.[9]

Compression Therapy Compression therapy includes the use of specialized low-stretch bandages that promote proper pressure distribution. This improves lymphatic flow and leads to a reduction in limb volume. The effect of compression therapy on the lymphatic system involves the reduction of excess interstitial fluid by decreasing blood ultrafiltration and enhancing resorption. In the venous system, compression therapy reduces reflux and improves venous return, thereby decreasing venous hypertension. In addition to these effects, compression therapy addresses trophic changes by releasing anti-inflammatory mediators and minimizing areas of interstitial fibrosis. Compression therapy alleviates pain, enhancing functionality and quality of life.[10]

Goal of Compression Therapy The goal of compression therapy is to reduce limb volume through multilayer bandaging. This approach leads to a better clinical response, as the pressure exerted on the limb during muscle contraction (working pressure) depends on several factors: the type of material, the degree of elasticity or stretch (tension applied during bandaging), the force exerted by the bandage (number of layers), and the condition of the material (duration of use, washing method). For the treatment of lymphedema, it is recommended to use low-stretch bandages. The greater the tissue pressure in the interstitium exerted by compression, the better the absorption of interstitial fluid.[11] However, sustained high pressure can lead to occlusion of blood capillaries, resulting in pain and skin damage.[12] When determining the ideal pressure, it is essential to consider the type and severity of lymphedema, the presence of fibrosis, and the condition of the skin.[13] In the second stage of lymphedema treatment, the use of compression garments is indicated. For each clinical situation, it is necessary to assess the appropriate class of compression, which depends on the physical and dynamic aspects of the tissues (elasticity and stiffness), as well as the individual characteristics of each patient (skin texture, limb size, localization of swelling, presence of lymphostatic fibrosis, and functionality of the affected limb).[11] Special Exercises and Physical Activity These exercises are aimed at maintaining the achieved effects during other stages of treatment. Regular physical activity promotes improved lymphatic flow and the overall condition of the patient. The goal of active exercises is to increase venous return and lymphatic drainage through the muscle pump mechanism. These results are enhanced when performed in compression garments.[9 14-15] Safe exercises include: stretching, swimming, walking, resistance training, strength training, and aerobic exercises.[16-17].

Skin Care

Skin care is essential for the prevention of erysipelas. It is important to maintain the skin in good condition to avoid infections and complications. Patients with lymphatic insufficiency may exhibit skin changes such as thickening, hyperkeratosis, papillomatosis, deepening of skin folds, skin fissures, dermal fibrosis, and lymphorrhea, among others. These complications are associated with a higher risk of infection and deterioration in the severity of lymphedema, functionality, and quality of life.[18-19]

These methods, when used in combination, help effectively manage lymphedema, improving the quality of life for patients and reducing the manifestations of the disease.

Surgical Treatment

Surgical treatment of lymphedema involves several methods aimed at restoring normal lymphatic flow and reducing swelling.

Let's consider the main techniques: Lymphovenous Anastomosis

Lymphaticovenular anastomosis (LVA) or lymphovenous shunt is a surgical procedure in which an anastomosis is created between overloaded lymphatic vessels, proximal to the site of lymphatic obstruction, and adjacent venules.[20] Research has shown that lymphaticovenular anastomosis (LVA) is more effective in the early stages of lymphedema due to the absence of functional changes in the lymphatic ducts, which are characteristic of the later stages of lymphedema. [21-23]

Advantages of this Treatment:

1. Low risk of postoperative complications.
2. Patients are often discharged home on the day of surgery or after one day of observation.
3. In certain cases, the procedure can be performed under a local anesthesia.

Disadvantages

1. Technical complexity in handling vessels and creating anastomoses. Sometimes the vessel caliber may be as small as 0.2 mm.
2. The need for specialized super-microsurgical instruments and high-resolution optical microscopes.[24]

Lymph Node Transplantation

This procedure involves the transplantation of tissue complexes containing lymphatic vessels and nodes. These are harvested from a donor site and transferred to the affected limb as a free tissue graft. The decision to perform the transplantation is based on the severity of lymphedema, the availability of recipient vessels, and the surgeon's preferences.[25]

A meta-analysis compared the outcomes of lymph node transplantation and lymphaticovenular anastomosis (LVA) in cases of limb lymphedema.[26] The final results indicated that both procedures were effective in the short term. However, patients undergoing lymph node transplantation demonstrated significant long-term improvement with a high likelihood of discontinuing the use of compression garments. One of the main disadvantages of lymph node transfer is the potential for iatrogenic secondary lymphedema at the donor sites. A method to prevent this complication involves the use of reverse mapping to identify and protect the lymph nodes that primarily drain the limb, preserving them during the harvest of inguinal or lateral thoracic lymph nodes.[27]

Liposuction

Excess accumulation of fat and fibrotic changes in tissues are among the pathological manifestations of chronic lymphedema. However, the pathophysiological mechanism of fat tissue accumulation in lymphedema remains controversial. Liposuction has been widely used as a reduction method to remove hypertrophied subcutaneous adipose tissue from the affected limb. However, liposuction does not improve the lymphatic system, and therefore, patients need to wear compression garments for life to prevent recurrence.[28] These surgical methods can significantly improve the quality of life for patients with lymphedema by reducing the manifestations of the condition and restoring normal limb function.

Our Experience

From 2021 to 2023, we evaluated over 310 patients who had previously received treatment at our center and sought further surgical intervention or reconstruction. Among them, 30 patients were diagnosed with lymphedema stages 2 to 4. The diagnosis was performed using ICG lymphography, volumetric measurements, and physical examination.

Main Patient Complaints:

A sensation of heaviness and distension in the upper limb on the surgical side.
Swelling of the upper limb. Impaired function of the upper limb.
Recurrent erysipelas.

Measurements and Tests:

The average volume difference between the healthy arm and the arm affected by lymphedema was 5-6 cm. The affected arm exhibited:

-Positive Pitting test.
-Stemmers sign.

Application of Complex Physical Decongestive Therapy (CPDT):

For Complex Physical Decongestive Therapy (CPDT), we utilized specialized low-stretch bandages and dipole compression garments. These measures contributed to the improvement of patient conditions and reduction of lymphedema manifestations.

Conclusion: The implementation of conservative methods in practice significantly enhances the quality of life for patients with lymphedema, enabling them to return to an active lifestyle and alleviate disease symptoms.

Treatment Results

The patients underwent courses of Complex Physical Decongestive Therapy (CPDT). On average, the number of sessions ranged from 5 to 10. After completing the courses, the patients subjectively reported a significant improvement in their overall well-being, manifested in the following aspects:

Decreased heaviness in the affected limb
Reduction in swelling
Restoration of range of motion in the limb
Upon measuring volume, the average difference between the healthy arm and the arm with lymphedema before the procedures was 5-6 cm. After the procedures, this difference decreased to 1-2 cm or disappeared entirely.
To confirm the results, a follow-up control ICG lymphography was performed, which also demonstrated positive dynamics.

Conclusions

Complex Physical Decongestive Therapy (CPDT) is considered the "gold standard" for the treatment of lymphedema, leading to a significant improvement in patients' quality of life. This method does not impose a high economic burden, as it requires only specially trained medical personnel and specific bandages. The high efficacy of CPDT and the lack of alternative conservative treatment methods for lymphedema underscore the necessity of its incorporation into medical standards for patient care. The adoption of this technique in surgical facilities allows for timely intervention in emerging limb issues and reduces the likelihood of postoperative complications, such as lymphedema. Based on our experience, after integrating a lymphedema specialist into the surgical unit and training the nursing staff in the fundamentals of lymphedema treatment, we observed a decrease in cases of one of the primary complications: erysipelas. Certainly, these findings require long-term study. However, the positive clinical outcomes resulting from our multidisciplinary efforts indicate that our experience may serve as a model for other healthcare institutions adhering to the principles of comprehensive breast cancer treatment.

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