Research Progress on Postoperative Limb Lymphedema in Breast Cancer

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DOI: 10.32629/ajn.v4i3.1463

Abstract: Purpose: This article reviews the mechanisms, factors, and preventive measures of upper limb lymphedema following breast cancer surgery. Methods: Extensive review of recent research literature on factors and prevention of upper limb lymphedema after breast cancer surgery in the past five years, followed by analysis and summary. Conclusion: Postoperative upper limb lymphedema significantly impacts the function and mobility of the affected limb. The formation of upper limb lymphedema is a chronic process, and to date, there is no treatment that can fully restore the affected limb. Therefore, early detection, preventive measures, and the proactive adoption of effective strategies have become a new approach to treatment. By systematically elucidating the mechanisms, factors, and preventive measures of postoperative upper limb lymphedema in breast cancer, adopting effective preventive measures can reduce the occurrence of upper limb lymphedema, alleviate patient suffering, and improve the quality of life.

***Keywords*:** breast cancer, lymphedema, etiology, prevention, review

1. Introduction

According to the latest data from the National Cancer Center Tumor Registration Office, globally, there are 2.088 million new cases of breast cancer annually, with approximately 627,000 deaths. The incidence and mortality rates of breast cancer are still on the rise, including in the Asia-Pacific region, which includes China [1]. Currently, the preferred treatment for breast cancer is surgery, and axillary treatment methods include axillary lymph node dissection and sentinel lymph node biopsy. Surgery disrupts the normal axillary lymph nodes of patients, leading to lymphatic circulation disorders. Limb lymphedema is a common chronic complication after treatment, mainly occurring within 3 months to 3 years postoperatively, with a rate exceeding 20% within the first 2 years after surgery [2]. The cause may be the blockage of lymphatic vessels during axillary lymph node dissection, leading to the removal of lymph nodes, stimulating connective tissue with proteins in the tissue fluid, resulting in skin hyperplasia and keratosis, ultimately causing lymphedema [3]. This leads to swelling, pain, fibrosis, restricted self-care ability, and, in severe cases, irreversible upper limb functional impairment, and may even lead to erysipelas and lymphangitis, significantly impacting postoperative recovery and quality of life for patients. This article reviews relevant literature on postoperative lymphedema in breast cancer, organizing and summarizing the factors and prevention of postoperative lymphedema in breast cancer, aiming to provide guidance for clinical practice. The review is presented below.

2. Definition of Breast Cancer Related Lymphedema (BCRL)

Breast Cancer Related Lymphedema (BCRL) refers to the chronic condition of continuous swelling in the limbs caused by the destruction of lymphatic structures or blockage of lymphatic vessels after breast cancer surgery, leading to the accumulation of lymphatic fluid due to impaired lymphatic circulation. Upper limb lymphedema in breast cancer patients typically manifests several months to years after treatment, affecting areas such as the hands, arms, chest, and upper torso. Among these, arm lymphedema is the most severe.

3. Mechanisms of Upper Limb Lymphedema

Upper limb lymphedema is a common complication after breast cancer surgery, resulting in varying degrees of swelling in the affected limb. This not only affects the postoperative quality of life but also has a significant impact on postoperative survival. The pathogenic mechanisms are complex and can be summarized as follows:

3.1 Surgery

Following radical axillary lymph node dissection or sentinel lymph node biopsy for breast cancer, the lymphatic network is disrupted, severing the lymphatic reflux route for the upper limb. This results in the retention of a large amount of protein-rich lymphatic fluid in the tissue interstitium. The increased colloid osmotic pressure in the tissue interstitium stimulates the proliferation of fibroblasts, releasing collagen [4]. Collagen causes fibrosis in the subcutaneous tissue, and the lack of oxygenation due to impaired phagocytosis by macrophages worsens, gradually leading to the formation of lymphedema.

3.2 Decline in Lymphatic Pump Function Hypothesis

This hypothesis suggests that patients with upper limb lymphedema have an innate insufficient reserve of lymphatic pump function. After clearing the axillary lymph nodes, the load on the lymphatic pump of the upper limb increases. In the early stages, when the lymphatic pump is within the compensatory range, upper limb swelling is not significant. However, prolonged overload leads to the gradual failure of lymphatic pump function, resulting in clinical lymphedema [5].

3.3 Interstitial Pressure Imbalance Theory

This theory posits that static pressure and fluid velocity in tissue interstitium can regulate the flow of lymphatic fluid and promote the formation of lymphatic fluid [6]. Due to the decline in lymphatic pump function, the lymphatic reflux route is obstructed. The decreased flow of tissue interstitial fluid into capillary lymphatics stimulates the secretion of vascular endothelial growth factor-C (VEGF-C). VEGF-C binds to receptors on surrounding capillaries, increasing the permeability coefficient of capillaries to fluid. As a result, a large amount of fluid exits capillaries into the tissue interstitium, increasing interstitial fluid static pressure and causing lymphedema. The low protein phenomenon in upper limb lymphedema is explained by the fact that VEGF-C binding to its receptor increases water permeability without a corresponding increase in protein permeability.

4. Risk Factors for Lymphedema

Some studies suggest that upper limb lymphedema may reduce survival rates. Therefore, understanding the causes of upper limb lymphedema after breast cancer surgery helps us further prevent its occurrence and guides patients in avoiding lymphedema [7].

4.1 Physiological Factors

The occurrence of upper limb lymphedema is related to an elevated body mass index (BMI). Patients with a higher BMI have a heavier lymphatic load in the upper limb, correspondingly increasing the probability of developing lymphedema after surgery [8]. Even in groups of patients with lower BMI, the incidence of postoperative edema gradually increases with an increase in BMI. Therefore, controlling the BMI not only helps prevent the occurrence of upper limb lymphedema but is also crucial in delaying the onset of lymphedema in affected patients [4].

4.2 Surgical Procedures

Lymphedema is associated with surgical damage. Axillary lymph node dissection disrupts the lymphatic reflux route for the upper limb, causing obstruction to blood and lymphatic fluid reflux. This leads to an increase in interstitial protein concentration, a decrease in plasma colloid osmotic pressure, an increase in capillary permeability, and an increased amount of fluid filtered out from capillaries, ultimately resulting in lymphedema [9]. Therefore, for patients with early clinical staging and a lower likelihood of axillary lymph node metastasis, it is clinically advisable to appropriately reduce the scope of lymph node dissection to minimize the occurrence of postoperative lymphedema.

4.3 Radiation Therapy

Radiation therapy is a major risk factor influencing the occurrence of upper limb lymphedema after breast cancer surgery. Lymphatic vessels are relatively insensitive to radiation, while lymph nodes are sensitive to conventional radiation doses. Studies report that the addition of radiation therapy after modified radical mastectomy increases the incidence of upper limb edema from 9% to 26% [4]. Excessive or early radiation therapy to the axilla, before establishing collateral lymphatic circulation, can cause lymphatic dilation, edema, inflammatory cell infiltration, and lymphatic fibrosis, leading to lymphatic reflux obstruction. The incidence of upper limb lymphedema in patients receiving irradiation to the axillary region, whole breast irradiation, and whole breast irradiation combined with irradiation to the axillary region is reported to be 16%, 23%, and 31%, respectively [4]. Radiation therapy can also cause local muscle fibrosis, compress veins and lymphatic vessels, affect upper limb lymphatic reflux, and exacerbate or induce upper limb lymphedema.

4.4 Postoperative Infection

Poor wound healing or improper care leading to infection can result in lymphangitis, exacerbating damage to residual

lymphatic vessels. Accumulated exudate in the tissue interstitium increases interstitial pressure, hindering the reconstruction of new lymphatic vessels and delaying the establishment of collateral circulation. This, in turn, exacerbates or induces upper limb lymphedema. Severe upper limb lymphedema is prone to recurrent streptococcal infections, leading to lymphangitis and cellulitis [10].

4.5 Upper Limb Trauma

Postoperative trauma to the affected upper limb can lead to the release of chemical substances such as histamine and inflammatory factors in the local tissues. This affects vascular permeability and further influences microcirculation, exacerbating or inducing upper limb lymphedema. Additionally, trauma may also lead to infection.

4.6 Chemical Agent Irritation

If the skin of the affected upper limb comes into direct contact with various chemical agents postoperatively, there is a possibility of damaging the skin or penetrating into the muscles. This can trigger the release of various chemical substances in the body, or even damage blood vessels and lymphatic vessels, thereby exacerbating or inducing upper limb lymphedema.

4.7 Improper Exercise

Early postoperative activity of the affected upper limb may cause local exacerbation of injury, while delayed activity is not conducive to promoting the reflux and circulation of lymph in the upper limb [8]. Excessive movement or weight-bearing on the affected upper limb increases blood circulation and, consequently, lymph production, exacerbating or inducing upper limb lymphedema.

4.8 Age

With advancing age, lymphatic-venous shunts gradually decrease, and due to diminished metabolic function, the lymphatic reconstruction function is relatively poor. The compensatory mechanism for overall lymphatic reflux weakens, increasing the likelihood of postoperative edema.

4.9 Hypertension

Elevated blood pressure in patients increases the overall amount of substances such as water and proteins permeating from blood vessels to tissues. This leads to sodium and water retention, causing an increase in interstitial fluid and, consequently, an increase in lymphatic fluid generation. This exacerbates or induces upper limb lymphedema.

4.10 Tumor Recurrence

Lymphatic channels are the primary pathways for regional metastasis of breast cancer. When tumor metastasis occurs in lymph nodes, it can form cancer emboli blocking lymphatic vessels. Sometimes, direct compression of lymphatic vessels by the tumor can also affect lymphatic reflux, leading to progressive worsening of upper limb swelling [5].

5. Staging of Lymphedema

Currently, the most widely used staging method is the International Society of Lymphology (ISL) staging standard, which divides lymphedema into four stages [11].

Stage 0: Latent or subclinical stage. In this stage, the patient's lymphatic system has been damaged, but there is no abnormal volume measurement of the affected limb, and no obvious clinical symptoms are present. This stage can persist for months or even years.

Stage I: Protein-rich lymphatic fluid accumulates in the connective tissue, leading to noticeable limb swelling. If the limb is elevated, the swelling may temporarily subside. Indentation edema may be present at this stage. With proactive treatment at this stage, it is often possible to control the progression of lymphedema and achieve a better prognosis.

Stage II: Swelling does not subside when the limb is elevated, and tissue fibrosis begins, causing the limb to become hardened. As fat and fibrous tissue accumulate, the symptoms of indentation edema gradually disappear. The most significant feature of this stage is the change in limb tissue, requiring comprehensive edema reduction therapy to potentially delay symptoms.

Stage III: The most typical characteristic of this stage is lymphostatic elephantiasis. At this point, fat deposition and tissue fibrosis become more severe, pressing on the limb does not produce indentation edema, and the skin shows pigmentation due to nutritional abnormalities. Warty growths may appear on the skin, and infections become more frequent. Although intensified physical edema reduction therapy can alleviate symptoms at this stage, it is challenging to restore the limb to its pre-disease form. In some cases, surgery may be chosen to reduce the severely enlarged limb.

Currently, breast cancer-related upper limb lymphedema staging standards based on arm circumference or volume measurements are also widely used in some clinical and research settings. The American Physical Therapy Association

classifies lymphedema based on the difference in circumference between the swollen limb and the unaffected limb: <3 cm is considered mild lymphedema, 3-5 cm is moderate, and >5 cm is severe [12].

6. Lymphedema Assessment Methods

6.1 Objective Measurement Assessment

Circumferential Measurement Method: This is the most commonly used method in clinical practice. It involves measuring the circumferences of different parts of both upper limbs. By applying specific formulas or assessing changes in upper limb circumferences, the circumferences are converted into volumes. The results of the affected side are then compared to those of the unaffected side to evaluate the occurrence and severity of lymphedema. However, in clinical practice, this method lacks uniform standardization, with variations in the number of measurement points, the selection of unknown measurement points, and the assessment of measurement results. For example, Deutsch M et al. [13] measured circumferences at the elbow joint, wrist, and at 5cm, 10cm, 15cm, and 20cm above and below the metacarpophalangeal joints. The sum of values on the affected limb exceeding that of the healthy limb by 5cm was defined as edema. Some researchers argue that converting upper limb circumferences into volumes for comparison can more accurately assess the edema condition of the affected limb.

Water Displacement Method: This is considered the gold standard for measuring upper limb lymphedema.

Perometry and Bioelectrical Impedance Spectroscopy (BIS): These are non-invasive monitoring techniques that utilize the electrical characteristics of biological tissues to extract physiological information from the human body. Early lymphedema is characterized by increased extracellular fluid, and BIS can specifically analyze changes in extracellular fluid. It can be used to detect early lymphedema without obvious clinical symptoms.

6.2 Subjective Measurement Assessment

Also known as Self-Reported, it refers to the patient's self-awareness of upper limb edema and subjective symptoms associated with upper limb lymphedema, such as pain, numbness, restricted movement, skin changes, etc. It mainly involves assessing the patient's subjective feelings through tools like questionnaires, judging the presence of edema, but with lower accuracy compared to objective methods [14].

6.2.1 Norman Questionnaires

This is the most commonly used method, and it can be administered through phone calls or emails to assess the patient's subjective symptoms conveniently. It is suitable for retrospective analysis and is the preferred method when objective measurement is not feasible. The Norman questionnaire primarily asks the patient (including relatives) about the differences in the hands, forearms, and upper arms over the past three months. Scores are assigned for each answer, and the total score is calculated for classification to diagnose whether the patient has BCRL. If there is no difference, it scores 0 points; if only the patient notices mild edema, it scores 1 point; if people familiar with the patient can also notice edema in daily life, it is considered moderate severity, scoring 2 points; if strangers can also notice it, it is considered severe edema, scoring 3 points. A score of 0 is negative, 1-3 points indicate mild lymphedema, and ≥4 points indicate moderate/severe lymphedema. The original questionnaire shows good consistency among different physical therapists, with a weighted Kappa value of 0.76, sensitivity of 0.86-0.92, and specificity of 0.90. The Chinese version also demonstrates good reliability and validity, but the diagnostic performance is weaker than the original scale [15].

6.2.2 Lymphedema and Breast Cancer Questionnaires

This is a structured scale created by scholars, and it can be administered through interviews or self-reports. It includes a total of 58 items divided into three parts: subjective symptoms of lymphedema (first 30 items), lymphedema management, and demographic information. It covers 19 symptoms, including breast swelling, tightness, heaviness, numbness, soreness, pain, stiffness, swelling, arm weakness, fluid accumulation, and limb activity. Respondents answer "yes" or "no" based on their experiences of symptoms in the past month and the past year. For affirmative answers, respondents need to indicate whether they have taken relief measures. The internal consistency coefficient for the 19-item symptom assessment part of this questionnaire is 0.785, and the test-retest reliability is 0.98 [16].

7. Prevention and Care of Upper Limb Lymphedema

Due to the irreversible nature of lymphedema, which can even lead to disability, the key to preventing and treating lymphedema after breast cancer surgery lies in proactive measures. Choosing appropriate surgical procedures, minimizing damage to axillary lymph nodes, avoiding unnecessary radiation therapy, and engaging in timely and moderate physical exercise are all preventive measures that can effectively reduce the incidence of lymphedema to a certain extent.

7.1 Rational Selection of Surgical Procedures

Breast cancer is a systemic disease, and although regional lymph nodes play a major role in biological immunity, they are not an effective barrier for filtering cancer cell metastasis. Literature reports a postoperative upper limb swelling incidence of 49.1% following axillary lymph node dissection, with the rate gradually increasing over time [17]. Therefore, the fundamental measure to prevent upper limb lymphedema is to make a rational choice of breast cancer surgical procedures, minimizing damage to the lymphatic reflux pathway. Based on standardized surgery, a comprehensive consideration of the patient's specific conditions should be made to develop an individualized treatment plan. The goal is to choose a surgical approach that maximally reduces trauma to the patient's body and lowers the incidence of lymphedema.

7.2 Strict Adherence to Radiation Therapy Indications

For breast cancer patients, radiation therapy is a crucial treatment method, especially for those at high risk of local recurrence after breast-conserving surgery or total mastectomy [18]. However, radiation therapy can damage lymphatic vessels, causing venous obstruction in the treated area and exerting pressure on veins and lymphatic vessels, severely impacting upper limb lymphatic reflux. It is essential to strictly adhere to the indications for radiation therapy, taking into account factors such as the location of the lesion, pathological examination results, and the surgical approach. A personalized radiation therapy plan should be developed for each patient, determining appropriate irradiation sites and dosage while avoiding inappropriate radiation therapy. If a patient has already undergone axillary lymph node dissection surgery, postoperatively omitting axillary radiation therapy may be considered.

7.3 Manual Lymphatic Drainage

Manual lymphatic drainage is a therapeutic nursing approach that utilizes massage techniques to improve lymphatic reflux. The procedure begins by massaging the nearby healthy lymphatic vessels to enhance lymphatic flow. Subsequently, the affected limb is massaged from the distal end to the proximal end. The patient assumes a supine position, and the palms are placed flat on the massage area. The massage sequence includes the lymph nodes in the neck, including behind the ears, the lateral neck, and the clavicular lymph nodes, followed by the lymph nodes in the healthy side's axillary region, the affected side's shoulder towards the healthy side's chest and axillary lymph nodes, the incision site upwards towards the healthy side's chest, the incision site downwards towards the inguinal lymph nodes, the central part of the affected side's axillary region to above the deltoid muscle, the outer elbow, the elbow pit, the forearm, the back of the hand, and the palm.When the patient changes to a lateral position, the shoulder and back are divided into thirds, and massage is performed from the affected side towards the healthy side. This method significantly ensures the efficiency of lymphatic reflux in patients, preventing lymphedema. Simultaneously, it has a high recovery effect on early postoperative lymphedema. In a study by Zhang Lijuan and others [20], 500 patients undergoing radical mastectomy for breast cancer were randomly divided into an intervention group and a control group. The control group received routine health education on functional exercises for the affected upper limb. The intervention group, in addition to the routine education, underwent manual lymphatic drainage. The occurrence of axillary web syndrome in both groups was compared at 1 week, 1, 3, and 6 months postoperatively. Additionally, the arm circumference and shoulder joint abduction function of the two groups were compared at 24 hours preoperatively, 1 week postoperatively, and at 1, 3, and 6 months postoperatively. The results revealed that the incidence of lymphedema and axillary web syndrome in the intervention group was significantly lower than in the control group. Moreover, the shoulder joint abduction function was superior in the intervention group, and the differences were statistically significant ($P < 0.05$).

7.4 Infection Prevention

Delayed wound healing after surgery can reduce local resistance in patients and may potentially induce upper limb lymphedema. Postoperative poor drainage can lead to subcutaneous fluid accumulation in the axilla, wound infections, and wound edge necrosis, causing inflammation or scar hyperplasia, which can affect postoperative lymphatic regeneration and compensatory reflux [19]. Appropriate wound dressing changes are essential to prevent wound infections. Adequate pressure bandaging should be applied to avoid skin flap necrosis. Ensuring unobstructed drainage helps reduce fluid accumulation in the surgical area. In cases of localized fluid accumulation, prompt aspiration followed by pressure bandaging is recommended. If inflammation occurs, timely symptomatic treatment is necessary, and in the presence of infection, prompt control measures should be implemented.

7.5 Health Education

Health education, as the most economical, effective, and fundamental means of preventing postoperative lymphedema after breast cancer, has been widely advocated and utilized by scholars both domestically and internationally. Symptoms of lymphedema include sensations of heaviness, swelling, and tightness in the arm. In severe cases, the skin may thicken, and

the arm may become significantly enlarged, resembling elephantiasis. To prevent arm swelling and infection, patients should be given the following guidance.

7.5.1 Protecting the Skin, Avoiding Injury and Infection

Maintain hygiene and keep the affected limb clean and dry.Moisturize the skin regularly to prevent dryness and cracking.Practice proper nail care to keep the skin around the hands and nails soft and lubricated.Use sunscreen and insect repellent to protect exposed skin.When shaving underarms, use an electric razor and take care to avoid skin damage.Use thimbles when sewing.Avoid scratches or bites from pets.Wear gloves during activities that may cause skin damage, such as dishwashing, gardening, prolonged use of chemical agents, or handling detergents.Minimize punctures in the affected limb, such as injections and blood draws.Cleanse any abrasions or punctures, then apply adhesive bandages to prevent infection.Seek immediate medical attention in case of rash, itching, redness, pain, increased skin temperature, fever, or flu-like symptoms, as these may indicate a possible infection.

7.5.2 Avoiding Compression on the Upper Limb

Minimize blood pressure measurements on the affected limb.Wear well-fitting clothing and opt for loose-fitting jewelry.

7.5.3 Avoiding Extreme Temperatures

Keep warm in cold environments to prevent frostbite or skin cracking.Avoid prolonged exposure ($>$15 minutes) to hot environments, especially hot baths and saunas. Avoid immersing the affected limb in water exceeding 39°C.Use gloves when handling hot ovens, avoid carrying hot pots without protection to prevent burns or scalds.Do not apply excessively hot or cold stimuli to the affected limb.

7.5.4 Lifestyle

Avoid lifting heavy objects (above 5kg) with the affected limb [21], especially using the shoulder strap to carry heavy items.Rest and elevate the limb when experiencing pain.Avoid repetitive and strenuous movements, such as forceful pushing or pulling.Gradually establish a consistent daily activity suitable for one's physical condition.During activities, observe changes in the size, shape, tissue, texture, pain, or heaviness of the affected limb. Take regular breaks to allow the limb to recover and avoid excessive fatigue.Engage in regular physical activity: Maintain a lifelong commitment to physical activity. If physical activity is limited during work, engage in 1 hour of brisk walking or similar exercise daily, with at least 1 hour of vigorous exercise per week. Lower fat intake, balance the diet, and maintain an ideal weight.

Simultaneously, scientifically positioning the affected limb is crucial for preventing lymphedema. Often, ordinary pillows or clothing and quilts are placed under the lower part of the upper limb. However, due to insufficient elevation angles or excessive elevation, patients may not tolerate it well. Additionally, the uneven surface of the pillows or clothing may be uncomfortable for patients. In such cases, a medical soft pillow can be used as a substitute. While the goal of this approach is similar to the first two, it is more challenging to implement and may face issues of inadequate application despite its high usage rate.

7.5.5 Wearing Elastic Sleeves

Wearing elastic sleeves can prevent the worsening of edema. Appropriate elastic sleeves should be worn during intense activities such as prolonged standing or running. However, this should be avoided if the affected limb has open wounds or poor blood circulation. When flying, suitable elastic sleeves should be worn, and they should be removed only after waiting for half an hour to an hour after disembarking. Studies indicate that compared to other preventive measures, patients show better compliance with wearing elastic sleeves [22].

7.5.6 Compression Therapy

In the non-surgical treatment of lymphedema, comprehensive edema reduction therapy is currently the most widely used and effective treatment, with compression therapy playing a crucial role. Compression therapy can alleviate lymphedema by altering blood perfusion in the microcirculation of arteries, veins, and capillaries. Compression therapy mainly involves inflatable compression devices, gradient pressure elastic stockings, and compression bandaging [23, 24]. Research by Qiu Jiajia [25] and others explored the effects of compression elastic bandaging on improving upper limb lymphedema in postoperative breast cancer patients. Lymphedema therapists applied four layers of elastic bandaging with compression to patients. Follow-up outside the hospital primarily involved patients self-bandaging at home. The results indicated a decreasing trend in the circumference of the affected limb from the wrist to 10cm above the elbow on the affected side ($P<0.05$).

7.5.7 Functional Exercise

Currently, there is still debate about whether functional exercise can prevent postoperative lymphedema. Some studies suggest that early functional exercise can effectively prevent postoperative edema [26]. Exercises, such as finger extension, fist clenching, and wrist flexion, to promote lymphatic drainage should be performed 1-2 times a day in the first 1-2 days postoperatively. By days 3-5 postoperatively, increase to the third exercise, involving elbow flexion and extension. After suture removal, with the doctor's approval, increase to four or more exercises. Activities should progress gradually, with a grad-

ual increase in intensity. In the first 1-3 exercises, avoid outward movement of the upper arm and shoulder movement before suture removal. However, some studies argue that there is no statistically significant relationship between the occurrence of postoperative lymphedema in patients and rehabilitation exercise [27]. Exercise principles include gradual progression, avoiding excessive intensity, stopping when necessary, and providing individualized guidance based on the patient's specific situation to prevent accidental injury. Patients in special circumstances should consider reducing or delaying exercise time as needed [28].

8. Management Status of Upper Limb Lymphedema in Postoperative Breast Cancer Patients

With the deepening clinical practice of rapid recovery surgery, the average hospitalization time for breast cancer patients has significantly shortened, making post-discharge continuity care more crucial. Patients often lack knowledge of early diagnosis and treatment of lymphedema, and misinformation can delay timely medical attention. There is a common need among patients for information on the treatment and care of lymphedema. However, clinical doctors often focus only on the symptoms, treatment, and prognosis, neglecting the impact of lymphedema on patients. Moreover, clinical healthcare professionals have a limited level of knowledge about lymphedema treatment and care. Therefore, timely referral of lymphedema patients to specialized lymphedema treatment centers is crucial. In the United States, there are specialized lymphedema treatment centers and professional websites where practitioners regularly publish relevant information. Patients can visit lymphedema clinics led by lymphedema therapists and nurses to receive professional treatment and educational information [29]. Research by Tam [30] and others showed that 100% of oncologists, 79% of surgeons, and 36% of primary care physicians have referred breast cancer patients with postoperative lymphedema to specialized lymphedema treatment centers.

Lymphedema care in China is currently in its early stages, with no unified training and regulatory system for lymphedema treatment nurses. Training is being initiated in various provinces and cities across the country. Lymphedema treatment nurses mainly provide professional care for patients and develop intervention strategies. However, there is still a demand for continued professionalization. It is necessary to clarify the qualifications of relevant training institutions, establish a unified certification, supervision, and management system for lymphedema treatment nurses, and further improve the lymphedema treatment nurse system in China [31].

9. Conclusion

In summary, upper limb lymphedema after breast cancer surgery is a common complication. The causes of postoperative upper limb lymphedema are mainly related to surgical methods, radiotherapy, postoperative complications, health education, and functional exercise. Numerous studies indicate that once upper limb lymphedema forms after surgery, it is challenging to cure. Therefore, the emphasis should be on prevention.

During surgery, efforts should be made to minimize damage to the axillary lymphatic vessels, thus avoiding obstacles to the lymphatic fluid reflux in the upper limb. Early postoperative guidance encourages patients to perform functional exercises correctly to prevent missing the optimal period for limb function recovery. Regular postoperative exercises can also alleviate existing edema and reduce its severity. Early, comprehensive, and in-depth health education helps patients grasp relevant knowledge about lymphedema and preventive measures. This not only contributes to postoperative recovery but also enhances the overall quality of life for patients.

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