



Study on the relationship between lymphedema stage and related symptoms in patients with breast cancer after surgery

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Background: Breast cancer-related lymphedema (BCRL) seriously affects patients' quality of life. We aimed to understand the stage of postoperative lymphedema and the occurrence of related symptoms in breast cancer patients, and to analyze the relationship between the two, so as to provide reference for the implementation of targeted clinical interventions.

Methods: Convenience sampling method was used to select postoperative breast cancer patients attending the lymphedema evaluation clinic of a tertiary hospital in Shanghai for questionnaire survey. A professional lymphedema therapist assessed the severity of the patients' lymphedema according to the International Society of Lymphology (ISL) lymphedema grading criteria, and the Breast Cancer and Lymphedema Symptom Experience Index (BCLE-SEI) was used to assess the severity of the patients' lymphedema and patients' experience of lymphedema-related symptoms. This study aimed to understand the occurrence of lymphedema in breast cancer patients after surgery, and to explore the characteristics of related symptoms in patients with different stages of lymphedema.

Results: Of the 1,021 patients, 744 (72.86%) were in stage 0, 161 (11.36%) in stage 1, 98 (9.5%) in stage 2, and 18 (1.7%) in stage 3. The higher the lymphedema stage, the number and severity of symptoms significantly increased ($P < 0.001$), with stage 2 and 3 patients reporting more symptoms and greater severity compared to stage 0 and 1 patients. In terms of symptom distress, the higher lymphedema stage was associated with a significant increase in the total symptom distress score as well as in the functional and emotional dimensions of distress ($P < 0.001$).

Conclusions: The number of symptom presentations, symptom severity and their degree of distress increased with higher lymphedema stage. Attention should be paid to patients' symptom complaints, and early identification and timely intervention should be made in patients with stage 0 and 1 lymphedema to alleviate their symptoms and slow down the progression of edema.

Keywords: Breast cancer; lymphedema; symptoms; influential factor analysis; cross-sectional study

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Introduction

In recent years, the incidence of breast cancer has been increasing rapidly, and the prevalence increases with age (1). With the continuous progress of multidisciplinary diagnostic and therapeutic methods, the survival rate of patients has shown a significant increasing trend, and the prognosis and long-term survival have been improving (2). Breast cancer-related lymphedema (BCRL) is an edema formed due to the accumulation of lymphatic fluid in the interstitium of the affected limb or region as a result of damage to the lymphatic system, which can cause physical

symptoms such as swelling and numbness of the affected limb, pain, skin changes, and functional disability, etc. Its risk factors include genetic susceptibility, manual lymphatic drainage, physical activity, body weight, etc. (3). Nearly 20% of patients develop lymphedema after breast cancer treatment that includes axillary lymph node dissection (4). BCRL is a chronic and progressive process, and once it occurs, it is difficult to treat and can affect patients' quality of life in the long term (5), and patients may experience psychological symptoms such as negative self-perception of body image and emotional distress (6). Therefore, BCRL focuses on prevention, early detection and early intervention. Currently, the diagnostic evaluation of breast cancer lymphedema consists of the collection of objective clinical data (bioelectrical impedance measurements, infrared measurements, water displacement method, limb circumference measurements) (7) and patient-reported subjective symptoms. In addition to traditional assessment methods, innovative technologies such as computer algorithms and artificial intelligence integration are also being explored in the early detection of lymphedema (8). Based on the subjective and objective data, researchers have developed many classification methods for lymphedema, including Campisi classification, MD Anderson classification of lymphedema (9). Chen *et al.* explored methods for classifying breast lymphedema on the basis of findings from breast ultrasonography, physical examination, and patient reports (10). It has been shown that patients with early lymphedema present with symptoms, and that the symptom experience worsens as the edema worsens, so symptom evaluation is useful for early detection of lymphedema (11,12). However, it is unknown how symptoms characterize and develop in patients with different lymphedema stages. Therefore, the aim of this study was to understand the occurrence of lymphedema in postoperative breast cancer patients, to explore the characteristics of the associated symptoms in patients with different lymphedema stages, and to provide guidance for the early diagnosis and symptom management of lymphedema. We present this article in accordance with the STROBE reporting checklist (available at <https://gs.amegroups.com/article/view/10.21037/gs-2024-536/rc>).

Methods

Study design

The study used a cross-sectional design.

Highlight box

Key findings

- Higher lymphedema stages (2 and 3) correlated with significantly increased symptom frequency, severity, and distress, particularly in functional and emotional dimensions.
- Stage 3 patients had a higher mean number of axillary lymph nodes dissected compared to other stages.
- Even stage 0 patients reported symptoms (e.g., pain, numbness), highlighting the need for early symptom monitoring despite no clinically measurable swelling.

What is known and what is new?

- Breast cancer-related lymphedema (BCRL) is a chronic, progressive condition impacting quality of life, with risk factors including lymph node dissection and radiotherapy. Symptom assessment tools like Breast Cancer and Lymphedema Symptom Experience Index (BCLE-SEI) and objective measures (e.g., limb circumference) are used for diagnosis, but early detection remains challenging.
- Quantified symptom burden across lymphedema stages, demonstrating that symptom distress escalates with disease progression. Revealed that stage 0 patients experience symptoms, suggesting latent lymphedema may manifest before clinical signs. Highlighted the need to combine symptom reports (BCLE-SEI) with objective tools (bioelectrical impedance) for early diagnosis.

What is the implication, and what should change now?

- Early-stage patients (stage 0–1) require proactive symptom monitoring and interventions to prevent progression. Healthcare professionals should integrate symptom assessments with advanced diagnostic tools (e.g., bioelectrical impedance) to improve accuracy.
- Clinical practice: implement routine symptom screening and bioelectrical impedance for early-stage patients, even without visible swelling.
- Education: train patients to recognize and report early symptoms and emphasize preventive strategies.
- Research: develop validated tools to distinguish BCRL symptoms from post-surgical trauma and expand studies to diverse populations beyond tertiary centers.

Setting and participants

We conducted the study in the Shanghai Cancer Center, Fudan University, from June to December 2022. Breast cancer patients who attended the lymphedema assessment clinic were selected by convenience sampling method. The inclusion criteria were as follows: (I) diagnosed with breast cancer by pathology and have undergone surgical treatment; (II) age ≥ 18 years old, willing to participate in this study; (III) clear mind, able to carry out normal communication. The exclusion criteria were as follows: (I) had other malignant tumors; (II) had other mental diseases.

Data collection

In this study, a formally trained lymphedema therapist performed the assessment of patients' lymphedema staging, while questionnaires were used to collect data. Before the questionnaires were distributed, the purpose and content of the study, the time required to complete the questionnaires and the confidentiality of the study were explained to the patients. During the process, a uniform language was used to explain the filling requirements to the patients, and questions that arose from the patients were answered with consistent expressions. The questionnaires were completed on the spot, collected on the spot, and quality checked and summarized. A total of 1,049 questionnaires were distributed in this study, and 1,021 valid questionnaires were recovered, with a valid recovery rate of 97.3%.

Measures

Demographic information

A self-designed survey was used to collect participants' demographic information, which consisted of their socioeconomic characteristics [age, gender, body mass index (BMI), etc.] and medical data (surgical procedure, and axillary lymph node management).

Lymphedema grading standard (13) by International Society of Lymphology (ISL)

It is divided into 4 stages. Stage 0 is that although there is injury to the lymphatic system, there is no clinically measurable swelling or edema, and the clinical symptoms are not significant. Stage 1 is that the patient has symptoms of limb swelling, and the swelling can be temporarily relieved by lifting the limb; there are more body fluids accumulated in the subcutaneous tissue interstitial space, the skin is pale,

swollen, and the wrinkles become shallow, and the affected limb has a low local temperature, the elasticity is poor, and there is sunken edema when the finger presses on the local skin of the affected limb. Stage 2 is spontaneous irreversible lymphedema, after lifting the limb, the swelling of the affected limb will not subside, the limb tissue appears to be fibrosis, limb hardening; with the progress of the disease, fat and fiber accumulation, depressed edema gradually disappears. Stage 3 is severe edema, the affected limb fibrosis is more serious, fat deposition and hyperkeratosis of the skin as well as echinococcosis is obvious, the palpation will not appear depressed edema when pressed, and the skin may appear pigmentation, warty hyperplasia, and patients may develop recurrent infections. In this study, patients were assessed for lymphedema staging by a formally trained lymphedema therapist.

Breast Cancer and Lymphedema Symptom Experience Index (BCLE-SEI)

The scale was developed by Fu *et al.* to assess lymphedema-related symptom experience in breast cancer patients (14). The scale is divided into 2 dimensions, symptom onset and symptom distress, with a total of 56 entries. The symptom emergence dimension consists of 24 entries, each of which is scored on a 0–4 scale from “none” to “very severe”, with a total score of 0–96, with higher scores indicating more severe symptoms. The symptom distress dimension has 32 entries, including 6 aspects of functioning, socialization, sleep, sexuality, mood and sense of belonging, which are summed to give a total score of 0–128, with higher scores indicating more severe symptom distress. Shi *et al.* (15) applied the Chinese version of the BCLE-SEI to 219 BCRL patients to validate its reliability in the Chinese population, and the results showed that its Cronbach's α coefficient was 0.930–0.967, and its retest reliability was 0.705, which can be used to evaluate the symptoms and their effects on the patients with breast cancer-related lymphedema in China.

Statistical analysis

SPSS 22.0 software (IBM Corp., Armonk, NY, USA) was used for the data analyses. Count data were expressed as frequency and percentage, measurement data conforming to normal distribution were expressed as mean \pm standard deviation (mean \pm SD), and measurement data not conforming to normal distribution were expressed as

Table 1 General information of patients with different lymphedema stages and results of univariate analysis (n=1,021)

Variables	Stage 0 (n=744)	Stage 1 (n=161)	Stage 2 (n=98)	Stage 3 (n=18)	Statistical value	P value
Age (years)	50.80±11.69	51.26±12.54	49.29±10.25	52.11±12.05	0.517 [†]	0.60
BMI (kg/m ²)	23.24±3.38	22.68±2.92	23.24±3.38	22.97±2.72	0.255 [†]	0.86
Post-operative time (months)	9.90±19.75	11.59±25.24	13.53±28.90	8.28±17.29	1.028 [†]	0.38
Breast-conserving surgery	192 (25.80)	34 (21.12)	25 (25.51)	2 (11.11)	1.276 [‡]	0.20
Axillary lymph node dissection	547 (73.5)	123 (76.39)	71 (72.45)	16 (88.89)	2.319 [†]	0.46
Number of axillary treatments	15.73±8.43	15.50±8.08	15.42±7.91	19.66±6.78	1.428 [†]	0.23

Data are presented as mean ± standard deviation or n (%). [†], the F value; [‡], the *t*-value; [§], the χ^2 test; BMI, body mass index.

median (M) and interquartile range. Data were processed with *t* test, chi-square test and rank sum test, and the test level was $\alpha=0.05$. Analysis of variance (ANOVA) was used to compare the frequency of symptoms, symptom severity, and symptom distress among multiple groups, and two-by-two comparison were used to determine which specific groups had significant differences.

Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the Scientific and Ethical Committee of the Shanghai Cancer Center, Fudan University (No. 2209261-10) and informed consent was taken from all the patients.

Results

General information

A total of 1,021 patients were included in this study; age 21–84 (50.75±11.70) years; BMI 15.95–41.02 (22.97±3.10) kg/m²; postoperative time 1–181 (10.48±21.69) months Surgical methods: reconstructive surgery 164 (16.0%) cases, breast-conserving surgery (24.7%) cases; axillary lymph node treatments: sentinel lymph node biopsy 264 (25.9%) cases, axillary lymph node dissection 757 (74.1%) cases; the number of axillary lymph node treatments 1–41 (15.74±8.31). Using chi-square test, ANOVA and rank sum test, the general information and disease conditions of patients with or without lymphedema were compared, and none of them were found to be statistically significant ($P>0.05$). *Table 1* describes the general data of patients with different stages of lymphedema and the results of univariate

analysis. However, in two-by-two comparisons, there was a difference in the number of axillary lymph node dissection in patients with stage 3 lymphedema compared with those with stage 0, 1 and 2 ($P=0.047$, $P=0.044$, $P=0.047$). The mean number of axillary lymph node dissection in stage 3 patients was significantly higher than that in other stages. *Table 2* illustrates the 2×2 comparison between different stages of lymphedema and the number of lymph nodes dissected.

Occurrence of related symptoms in patients with different lymphedema stages

One-way ANOVA was used to compare the related symptoms in patients with different lymphedema. It was found that the differences in the number of symptom occurrences, symptom severity, total symptom distress score, and the two dimensions of function and mood in symptom distress among patients with different lymphedema stages were statistically significant ($P<0.001$). Further comparisons revealed that in terms of the number of symptom appearances and symptom severity, the differences between two-by-two comparisons were statistically significant ($P<0.001$), except for the comparison between stage 0 and stage 1; and in terms of the total symptom distress score and the dimensions of functioning and mood in symptom distress, the differences between two-by-two comparisons were statistically significant ($P<0.001$), except for the comparisons between stage 0 and stage 1, and the comparisons between stage 2 and stage 3. *Table 3* covers the mean scores and standard deviation values of the scores of patients with different stages of lymphedema in each dimension of the questionnaire, and compares the occurrence of related symptoms.

Table 2 Two-by-two comparison of different lymphedema stages with number of lymph nodes cleared

Lymphedema staging (subject)	Lymphedema staging (object)	Difference in mean values	Standard error	Significance	95% confidence interval	
					Lower limit	Upper limit
Stage 0	Stage 1	0.22321	0.72217	0.76	-1.1939	1.6403
	Stage 2	0.30396	0.89283	0.73	-1.4481	2.0560
	Stage 3	-3.93414 [†]	1.98184	0.047	-7.8231	-0.0452
Stage 1	Stage 0	-0.22321	0.72217	0.76	-1.6403	1.1939
	Stage 2	0.08075	1.06448	0.94	-2.0081	2.1696
	Stage 3	-4.15735 [†]	2.06486	0.044	-8.2092	-0.1055
Stage 2	Stage 0	-0.30396	0.89283	0.73	-2.0560	1.4481
	Stage 1	-0.08075	1.06448	0.94	-2.1696	2.0081
	Stage 3	-4.23810 [†]	2.13056	0.047	-8.4189	-0.0573
Stage 3	Stage 0	3.93414 [†]	1.98184	0.047	0.0452	7.8231
	Stage 1	4.15735 [†]	2.06486	0.044	0.1055	8.2092
	Stage 2	4.23810 [†]	2.13056	0.047	0.0573	8.4189

[†], the significance level for the difference in means is 0.05.

Table 3 Comparison of the occurrence of associated symptoms in patients with different lymphedema stages (n=1,021)

Variables	Stage 0 (n=744)	Stage 1 (n=161)	Stage 2 (n=98)	Stage 3 (n=18)	F value	P value
Number of symptoms	7.99±5.66 ^{§,¶}	8.78±5.99 ^{§,¶}	10.62±5.54 ^{†,‡,¶}	14.11±5.21 ^{†,‡,§}	12.43	<0.001
Severity of symptoms	10.00±8.18 ^{§,¶}	11.44±10.02 ^{§,¶}	14.21±10.34 ^{†,‡,¶}	22.66±10.29 ^{†,‡,§}	18.26	<0.001
Total symptom distress score	14.79±15.06 ^{§,¶}	16.65±16.57 [§]	20.58±16.37 ^{†,‡,¶}	25.55±13.27 ^{†,‡}	6.76	<0.001
Function dimension	4.19±5.82 ^{§,¶}	5.04±6.30 ^{§,¶}	6.67±8.35 ^{†,‡}	9.00±8.96 ^{†,‡}	7.85	<0.001
Social dimension	2.00±2.23	2.32±2.45	2.13±2.27	2.55±1.46	1.22	0.30
Sleep dimension	0.68±1.01	0.65±0.94	0.58±0.81	0.61±0.91	0.35	0.79
Sex dimension	0.56±1.24	0.66±1.43	0.67±1.16	0.44±1.24	0.50	0.68
Emotion dimension	6.62±7.43 ^{§,¶}	7.26±8.56 ^{§,¶}	9.78±7.07 ^{†,‡}	12.11±8.66 ^{†,‡}	7.63	<0.001
Sense of belonging dimension	0.71±0.89	0.69±0.93	0.73±0.80	0.83±0.78	0.14	0.93

Data are presented as mean ± standard deviation. [†], the difference is statistically significant when compared with the stage 0 edema group; [‡], the difference is statistically significant when compared with the stage 1 edema group; [§], the difference is statistically significant when compared with the stage 2 edema group; and [¶], the difference is statistically significant when compared with the stage 3 edema group.

Discussion

Occurrence of postoperative lymphedema in breast cancer patients

In this study, 744 patients were diagnosed with stage 0 (72.87%), 161 with stage 1 (15.77%), 98 with stage 2 (9.5%), and 18 with stage 3 (1.7%), indicating that lymphedema was present in different stages after breast cancer surgery.

The results of this study showed no significant relationship between age and the occurrence of lymphedema, which is in agreement with Clark *et al.* (16). However, Geller *et al.* (17) showed that patients below 50 years of age were more likely to develop lymphedema, whereas Hayes *et al.* (18) showed the opposite result, with the incidence of lymphedema in patients greater than 50 years of age being three times higher than in patients less than 50 years of age.

In previous literature body mass index ≥ 24 kg/m², number of lymph node dissection ≥ 15 and radiotherapy were risk factors for BCRL, but the results of the present study showed negative results for body mass index in patients with different stages. It has been found that patients with high adiposity have muscle relaxation in the organism, decreased muscle contractile function, impeded lymphatic fluid return, and increased reflux load, which leads to the development of BCRL (16,19). However, BMI does not distinguish between muscle and fat (20). It is possible that high BMI and low body fat percentage or low BMI and high body fat percentage existed in the patients of this study, which limits the effect of BMI on the occurrence of lymphedema. This also suggests that in addition to BMI, we need to further understand the effect of body fat percentage or fat distribution on BCRL. There was a significant difference in the number of axillary lymph nodes cleared in patients with stage 3 lymphedema in this study compared to patients with stages 0, 1, and 2. The occurrence of BCRL is related to the extent of surgical wave to the axilla (21). In this study, the mean number of axillary lymph nodes cleared in patients with stage 3 was significantly higher than that of the remaining stages, and the extent of clearance was greater, resulting in impeded return of lymphatic fluid from the upper extremities to the subclavian lymph nodes, which induced a higher risk of BCRL (22).

Symptomatic experience of postoperative lymphedema in patients with breast cancer

The results of this study showed that compared to stage 0 and 1 patients, stage 2 and 3 patients reported more symptoms, with an increase in severity and total distress scores, which is consistent with the study by Liu *et al.* (11). There was no significant difference between stage 0 and stage 1 patients in terms of the number of symptoms present and symptom severity. This may be due to the fact that stage 0 patients may still report symptoms such as pain and numbness in their affected limbs even though they do not have clinically measurable swelling, which is consistent with the findings of Wang *et al.* (23). It was also found that more than 50% of breast cancer patients with undiagnosed lymphedema reported at least one lymphedema-related symptom (24). And the difference in the degree of symptom distress was not statistically significant between stage 0 and stage 1, stage 2 and stage 3 patients. However, the number and severity of symptoms as well as the degree of symptom distress, especially functional distress and emotional distress,

were much greater in patients with stage 2 and 3 than in those with stage 0 and 1. A study by Dominick *et al.* (25) also confirmed the positive correlation between the number of symptoms and symptom distress. The present study is consistent with the study of Zhao *et al.* (26) who investigated 132 patients with breast cancer-related lymphedema and found that lymphedema stage was an influencing factor of limb function-disability-health in BCRL patients, with limb function being more affected in patients at stage 2 or 3 relative to those at stage 0. Lymphedema is a chronic progressive disease, and when it develops into stage 2 or 3, it is already in an irreversible stage. The accumulation of lymphatic fluid in the affected limb may lead to stiffness of the arm and elbow and limb movement limitation, and in severe cases, inflammation or cellulitis may occur, etc. Pathological changes such as skin fibrosis and acrocyanosis may lead to severe upper limb dysfunction, making it impossible for patients to carry out normal daily activities, and this also brings about a steep increase in emotional distress. The emotional distress increases dramatically, and the changes in daily life and body image associated with lymphedema further deepen the patients' worries and anxiety (27). Zhang *et al.* (28) investigated 71 patients with upper limb lymphedema after breast cancer surgery, and more than 30% of the patients had anxiety or depression, and the patients realized that the swelling of the limbs had a great impact on their psychology and activities, and the more pronounced the swelling was, the more serious their anxiety and depression were, which was basically the same as the results of this study. Foreign researchers have also pointed out that there is a correlation between the frequency of lymphedema symptoms and the negative emotions of patients, and that lymphedema symptoms can aggravate the role of patients with the disease brought (29). Therefore, early screening and early intervention for BCRL are crucial.

Close attention should be pay to patients' early symptom complaints and strengthen early screening and intervention

The findings suggest that discomfort complaints in early-stage patients, including stage 0 stage 1, should be emphasized. Breast cancer patients face a lifetime risk of developing lymphedema, and reporting symptoms may be an early indication that patients are in the latent phase of lymphedema, in which changes cannot be detected by measures such as limb circumference (30). Due to the lack of information and targeted guidance on symptoms,

patients often seek professional help only after significant swelling has developed. Without timely assessment and intervention at an early stage, further progression of lymphedema will severely limit the patient's daily activities, resulting in intense discomfort and frustration. Therefore, it is important to focus on and manage the symptoms of lymphedema, and to identify signs of lymphedema early in conjunction with limb signs, symptom monitoring, and bioelectrical impedance analysis to buy time for clinical management (31). Establish a tertiary prevention system for BCRL (32) to allow for early screening early diagnosis and early treatment. Provide effective and standardized preventive interventions for stage 0 and 1 patients as early as possible. Effective management of lymphedema symptoms through targeted preventive health education, manual lymphatic drainage and comprehensive decongestive therapy can help patients maintain normal arm dimensions, reduce the impact of lymphedema on limb function, alleviate their anxiety, improve their activities of daily living, and thus improve their overall quality of life.

The BCLE-SEI is not yet able to efficiently screen early-stage patients

Due to different surgical styles and axillary lymph node management, patients in the early postoperative period may experience varying degrees of symptoms related to scar tissue pulling (e.g., tightness, stiffness), a cluster of symptoms related to surgical trauma (pain, tenderness, weakness), and symptoms related to intercostal brachial nerve injury (33). This is similar to the symptoms of BCRL, but does not provide a diagnosis of lymphedema on this basis. There is often wide individual variation in the complaints and clinical presentation of patients with BCRL (6). Therefore, there is no "gold standard" for the diagnosis of BCRL (13), the specificity of subjective perception and self-report is not strong, and it is not possible to identify patients with early lymphedema based on the list of symptom indicators alone, and it is necessary to combine limb circumferential measurements, bioelectrical impedance, and even imaging methods to improve the accuracy and precision of diagnosis.

Perimeter measurements, bioelectrical impedance techniques are considered to be the most practical and effective in monitoring breast cancer-related lymphedema. In China, the diagnosis is often based on the difference of arm circumference between two upper limbs >2 cm. However, some patients have subjective edema symptoms

before the limb circumference changes, suggesting the presence of early lymphedema. At the same time, most people have a dominant hand, and the dominant limb can be more than 2 cm larger than the non-dominant limb under normal circumstances. Therefore, it is difficult to diagnose lymphedema by measuring arm circumference. Lymphatic radionuclide imaging or fluorescence is also the gold standard for the detection of early lymphedema, but most diagnosis and treatment institutions do not have professional equipment and personnel. Before the appearance of limb changes and subjective symptoms, bioelectrical impedance analyzes the tissue composition of the body by applying an electric current (5–1,000 kHz) to the body and monitoring the impedance through the body. Ultimately, the extracellular fluid composition is used to diagnose whether the patient has lymphedema and the severity of the edema (34). Shen *et al.* (35) showed that bioelectrical impedance monitoring has a higher sensitivity for diagnosing lymphedema compared to subjective symptom questionnaires. Therefore, combining the symptom index scale with limb circumference measurement with bioelectrical impedance can improve the diagnostic accuracy of BCRL.

Limitations

Several limitations to this study should be noted. First, data collection was conducted in a specialized hospital and did not capture the concerns of patients in general hospitals or hospitals in suburban areas. Thus, the extent to which our sample can be generalized is reduced. A qualitative study to explore more about the patients' experience, as well as experimental trials to examine and alleviate distress of lymphedema, are recommended for future research.

Conclusions

In this study, by analyzing the occurrence of symptoms in postoperative breast cancer patients with different stages of lymphedema, it was found that the number of symptom occurrences, symptom severity, and their degree of distress increased with the increasing severity of lymphedema grading; in the functional and emotional dimensions, the degree of distress in patients with stages 2 and 3 was much greater than that in patients with stages 0 and 1. We should pay attention to the patients' complaints, identify and intervene early in stage 0 and 1 lymphedema patients

to prevent them from developing irreversible chronic diseases. The diagnosis of BCRL is based on patient complaints combined with objective clinical examination. Further research could focus on preventive education and development of lymphedema interventions for stage 0 patients to alleviate their symptoms, reduce their impact on daily life, and ultimately improve their overall quality of life.

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Footnote

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the Scientific and Ethical Committee of the Shanghai Cancer Center, Fudan University (No. 2209261-10) and informed consent

was taken from all the patients.

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