

Review Article

Effects of cluster nursing on upper limb lymphedema and psychological state of patients treated with radiotherapy and chemotherapy after breast-conserving therapy

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Abstract: Objective: To determine the effects of cluster nursing on upper limb lymphedema and the psychological state of patients treated with radiotherapy and chemotherapy after breast-conserving therapy. Methods: Altogether 109 patients with early or middle stage breast cancer (BC) undergoing breast-conserving therapy in our hospital from February 2017 to April 2019 were enrolled as research subjects; of which 56 patients were given cluster nursing during treatment as the research group, and the rest were given routine nursing as the control group. The upper limb lymphedema and limb function of both groups were analyzed, and both groups were scored using the Hamilton depression rating scale and Hamilton anxiety scale before nursing and at discharge. Additionally, the sleep quality of the two groups was evaluated using the Pittsburgh sleep quality index at discharge, and their life quality was investigated at 3 months after discharge. Results: The control group showed a significantly higher incidence of lymphedema and significantly lower limb movement ability than the research group ($P<0.01$). In addition, before nursing, there was no significant difference in anxiety and depression scores between the two groups (both $P>0.05$), while after nursing, the scores of the research group were significantly lower than that of the control group ($P<0.01$), and the sleep quality of the research group was also better than that of the control group ($P<0.01$). Furthermore, the nursing satisfaction and average score of life quality for the research group were significantly higher than those of the control group (both $P<0.05$). Conclusion: Cluster nursing can effectively reduce upper limb lymphedema in patients treated with radiotherapy and chemotherapy after breast-conserving therapy, and can also promote the recovery of upper limb function of the patients and improve their psychological state and postoperative quality of life.

Keywords: Cluster nursing intervention, breast-conserving therapy, lymphedema, psychological state

Introduction

Breast cancer (BC) is the most common cancer among women, accounting for 25.1% of all cancers [1]. There are about 1.4 million new BC cases and nearly 0.46 million deaths of it worldwide [2], and the incidence and mortality of BC show certain regional differences. According to one report by Winters S et al. [3], the incidence and mortality of BC are gradually decreasing in developed countries, but they are increasing in less developed countries, which may be related to the popularization of early screening and the difference in treatment methods. Although great progress has been achieved in the treatment of tumors in recent years, BC is still a

major health problem that threatens the lives of women [4, 5]. Breast-conserving therapy is a commonly used clinical treatment method for early stage BC, which can meet the patients' desire of preserving their breasts and maintaining aesthetic images and can also meet their psychological needs. Moreover, a large number of studies have confirmed that breast-conserving surgery combined with radiotherapy and chemotherapy for early stage BC can obtain higher satisfaction than total mastectomy from patients, with equivalent efficacy [6, 7]. However, upper limb lymphedema on the operation side after breast-conserving surgery is a crucial factor that compromises the prognosis and quality of life of patients, and is also one

of the major complications [8]. At present, nursing for patients with malignant tumors after surgery has become a major research hotspot in clinical practice, but there are few studies on nursing for BC patients after breast-conserving therapy during radiotherapy and chemotherapy.

Faced with the increasingly severe clinical challenges of BC, some studies have pointed out that high-quality nursing is the key to improving the prognosis of patients during BC treatment [9]. Cluster nursing is a nursing mode combining a series of nursing methods verified by evidence-based medicine to deal with some refractory clinical diseases in order to improve the quality of nursing and ensure that all patients always receive the best nursing and treatment, which has been successfully applied to the management of equipment-related infection (DAIS) in critical nursing environment [10, 11]. One study by Parikh R et al. [12] has pointed out that cluster nursing can effectively reduce complications in acute exacerbation of chronic obstructive pulmonary disease. Moreover, one study by Fleming I O et al. [13] has concluded that cluster nursing can lower the recurrence rate after cardiac surgery. However, there are still few reports on the value of cluster nursing in the treatment of BC patients treated with radiotherapy and chemotherapy after breast-conserving therapy. We suspected that cluster nursing can alleviate the upper limb lymphedema of patients and improve their psychological state, and we carried out experimental analysis on it to provide references and guidance for future clinical treatment and nursing of BC patients.

Materials and methods

General materials

A total of 109 patients with early or middle stage BC who underwent breast-conserving therapy in our hospital from February 2017 to April 2019 were enrolled as research subjects; of which 56 patients were nursed with cluster nursing during treatment as the research group, and the rest were nursed with routine nursing during treatment as the control group. This experiment was approved by the Ethics Committee of Jingzhou Central Hospital, and all participants signed informed consent forms after understanding the study.

Inclusion and exclusion criteria

The inclusion criteria of the patients: Patients with clinical manifestations of BC and diagnosed with early or middle stage BC by pathologic biopsy in our hospital, patients undergoing breast-conserving therapy after diagnosis, and those treated with adjuvant radiotherapy and chemotherapy after surgery. The exclusion criteria of the patients: Patients with advanced BC, patients intolerant to surgery and radiotherapy, patients allergic to chemotherapy drugs, pregnant patients, patients unable to cooperate with the treatment due to mental diseases, patients without complete clinical data, and those transferred to our hospital.

Methods

All patients were given breast-conserving therapy by senior surgeons in our hospital, and then continuously given radiotherapy and chemotherapy after surgery. Patients in the control group were given routine nursing during treatment, including monitoring the changes of patients' vital signs, giving some simple health education to the patients, guiding and assisting the patients to complete rehabilitation exercises. Patients in the research group were given cluster nursing during treatment as follows: 1. A cluster nursing group was established and trained, and the evidence-based medicine method was employed to study treatment for upper limb lymphedema in BC patients treated with radiotherapy and chemotherapy after breast-conserving therapy, psychological changes of the patients were monitored, and causes of complications were explained to them, to develop a set of intervention measures consistent with cluster nursing, so that the group members can quickly and effectively use cluster nursing knowledge to nurse the patients during their hospitalization. 2. The nursing staff were arranged to give health education to the patients to prevent risk factors of upper limb lymphedema and help the patients be clear about the relevant matters needing attention. In addition, the staff were also arranged to regularly measure the arm circumference of the patients, closely observe their upper limb skin temperature and color, guide them and their families to regularly massage the lymph area of the patients, and also guide the patients to carry out upper limb functional exercise. Once lymphedema occurs, it

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was treated with an air wave pressure circle therapeutic apparatus once a day, 15 min each time. 3. The nursing staff were arranged to actively communicate with the patients, observe their negative moods in real time, and carry out relevant psychological counseling for them. In addition, appropriate plans were formulated according to the patient's personality to maintain a stable psychological state. 4. Relevant rules and regulations on cluster nursing were developed to ensure the implementation of the nursing plan.

Outcome measures

The incidence of upper limb lymphedema between the two groups at 1 month, 3 months, and 6 months after radiotherapy and chemotherapy was compared, and limb function of patients in the two groups was evaluated. Additionally, the activities of daily living (ADL) scale was employed to score the limb function of the two groups before and after nursing. The scale adopts a percentile system, and a higher score indicates better limb function. The Hamilton depression rating scale (HAMD) and Hamilton anxiety scale (HAMA) were adopted to evaluate the psychological state of the patients before nursing and at discharge, and the Pittsburgh sleep quality index (PSQI) was applied to evaluate the sleep quality of the patients [14]. A lower PSQI score indicates higher sleep quality. Furthermore, a life quality questionnaire was adopted to evaluate the life quality of the patients. The questionnaire adopts a percentile system, mainly covering physical function score, cognitive function score, social function score, non-adverse emotion score (including anxiety), non-recurrence score, and non-pain score. A higher score indicates better life quality. In a similar way, a nursing satisfaction questionnaire was adopted to evaluate the nursing satisfaction of the patients. The patients were asked to fill out the nursing satisfaction questionnaire anonymously at discharge. The questionnaire also adopts a percentile system, mainly covering satisfaction to nursing staff, evaluation of nursing ability, and evaluation of self-benefits, which indicates a high satisfaction with a score higher than 90 points, satisfaction with a score between 80 and 90 points, basic satisfaction with a score between 60 and 79 points, and dissatisfaction with a score lower than 60 points. The nursing satisfaction was recorded

as (the number of patients with high satisfaction + the number of patients with satisfaction)/the total number of patients × 100%.

Statistical analyses

In this study, the collected data were analyzed statistically using SPSS 20.0 and illustrated into required figures using GraphPad 5. Enumeration data were expressed as rate, and compared between groups using the chi-square test. Quantitative data were expressed as the mean ± standard deviation, and compared between groups using the t test. $P < 0.05$ indicates a significant difference.

Results

Comparison in general data

There was no significant difference between the two groups in clinical data including age, body mass index (BMI), tumor staging and site, marital status, education level, and smoking history (all $P > 0.05$). As such, the two groups were comparable. **Table 1.**

Incidence of upper limb lymphedema

Analysis showed that the incidence of lymphedema in the research group was significantly lower than that in the control group (10.71% vs. 26.42%, $P < 0.05$). **Table 2.**

Limb function evaluation

Before nursing, there was no significant difference in limb movement score between the two groups ($P > 0.05$). After nursing, both groups had a higher limb movement score, and the score of the control group was lower than that of the research group ($P < 0.01$). **Table 3.**

Psychological state assessment

Before nursing, there was no significant difference in psychological state scores between the two groups ($P > 0.05$). After nursing, both groups had significantly lower HAMD and HAMA scores (both $P < 0.01$), and the scores of the research group were significantly lower than those of the control group (both $P < 0.01$). **Figure 1.**

Comparison of sleep quality

Before nursing, there was no significant difference in PSQI score between the two groups

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Table 1. Comparison of clinical data [n (%)]

	The research group (n=56)	The control group (n=53)	t or χ^2	P-value
Age (Y)	43.67±5.49	45.23±5.61	1.467	0.145
BMI (kg/m ²)	22.34±2.53	23.15±2.74	1.605	0.112
Tumor staging			0.536	0.464
Early stage	25 (44.64)	20 (37.74)		
Middle stage	31 (55.36)	33 (62.26)		
Site			0.495	0.482
Left breast	27 (48.21)	22 (41.51)		
Right breast	29 (51.79)	31 (58.49)		
Marital status			0.929	0.335
Married	46 (82.14)	47 (88.68)		
Unmarried	10 (17.86)	6 (11.32)		
Education level			0.433	0.616
With junior high school diploma or below	22 (39.29)	17 (32.08)		
With senior high school diploma and above	34 (60.71)	36 (67.92)		
Smoking history			1.072	0.301
Yes	9 (16.07)	5 (9.43)		
No	47 (83.93)	48 (90.57)		

Table 2. Comparison of incidence of upper limb lymphedema at different time points

Group	The 1 st month	The 3 rd month	The 6 th month	Comparison of incidence (%)
The research group (n=56)	0 (0.00)	2 (3.57)	4 (7.14)	6 (10.71)
The control group (n=53)	2 (3.77)	5 (9.43)	7 (13.21)	14 (26.42)
χ^2				4.480
P-value				0.034

Table 3. Comparison of ADL score before and after nursing

Group	Before nursing	After nursing
The research group (n=56)	43.51±8.26	67.42±8.76 ^a
The control group (n=53)	42.82±8.19	84.33±9.17 ^a
T	0.438	9.846
P-value	0.663	0.000

a indicates $P < 0.01$ vs. the situation before nursing.

($P > 0.05$). After nursing, both groups had a lower PSQI score ($P < 0.01$), and the PSQI score of the research group was significantly lower than that of the control group ($P < 0.01$). **Table 4.**

Life quality assessment

Life quality score of the two groups at 3 months after discharge was compared. The average life quality score of the research group was significantly higher than that of the control group ((85.12±5.88) points vs. (82.85±5.66) points,

$P < 0.05$), and the life quality scores of the research group were all better than those of the control group in addition to cognitive function and disease recurrence (all $P < 0.05$). **Table 5.**

Comparison of nursing satisfaction

The overall nursing satisfaction of the research group was significantly higher than that of the control group (82.15% vs. 64.15%, $P < 0.05$). The majority of patients in the research group were very satisfied with the nursing, while the majority of patients in the control group were only satisfied with it. **Table 6.**

Discussion

BC is a common malignant tumor in women. With the change of modern lifestyle, its incidence and recurrence rate remain high, and increasingly younger people suffer from it in

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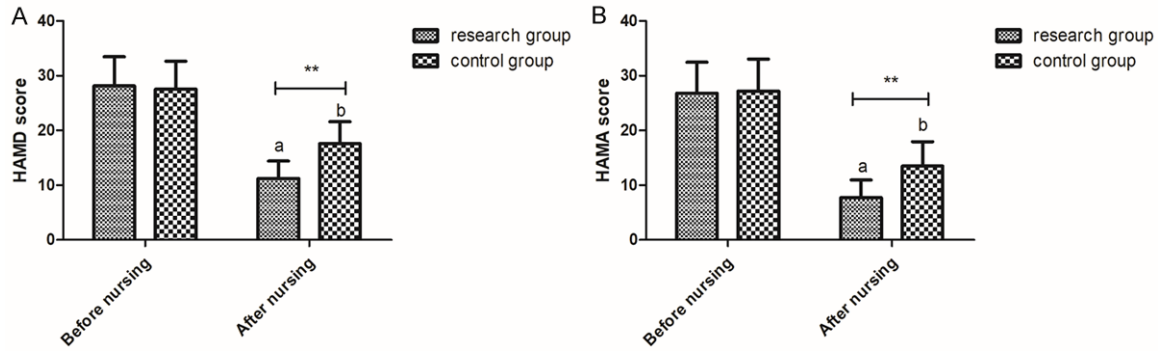


Figure 1. Comparison of psychological state scores between the two groups. A. Comparison of HAMD score. B. Comparison of HAMA scores. ** indicates $P < 0.01$; a indicates $P < 0.01$ vs. the research group before nursing, and b indicates $P < 0.01$ vs. the control group before nursing.

Table 4. Comparison of sleep quality score between the two groups

		The research group (n=56)	The control group (n=53)	t	P-value
Before nursing	Sleep quality	2.45±0.64	2.38±0.61	0.584	0.561
	Time for falling asleep	2.31±0.59	2.29±0.57	0.180	0.858
	Sleep time	1.47±0.42	1.38±0.36	1.198	0.234
	Sleep efficiency	1.29±0.32	1.23±0.30	1.009	0.316
After nursing	Sleep quality	1.23±0.41 [#]	1.51±0.46 [#]	3.359	0.001
	Time for falling asleep	1.34±0.49 [#]	1.68±0.57 [#]	3.345	0.001
	Sleep time	0.72±0.23 [#]	0.86±0.27 [#]	2.919	0.004
	Sleep efficiency	0.63±0.21 [#]	0.78±0.34 [#]	2.788	0.006

indicates $P < 0.01$ vs. the situation before nursing.

Table 5. Life quality score of the two groups

	The research group (n=56)	The control group (n=53)	t-value	P-value
Body function	88.69±6.15	84.51±5.69	3.678	0.000
Cognitive function	92.33±6.47	91.72±6.38	0.495	0.621
Social activity function	85.91±5.87	83.45±5.24	2.303	0.023
No negative emotion	79.42±5.32	77.23±5.67	2.080	0.040
No recurrence	84.12±5.37	83.73±5.21	0.385	0.701
No pain	80.26±6.11	76.45±5.78	3.340	0.001
Average score	85.12±5.88	82.85±5.66	2.051	0.043

Table 6. Comparison of nursing satisfaction between the two groups [n (%)]

	The research group (n=56)	The control group (n=53)	χ^2	P-value
Very satisfied	29 (51.79)	15 (28.30)		
Satisfied	17 (30.36)	19 (35.85)		
Basically satisfied	8 (14.29)	13 (24.53)		
Dissatisfied	2 (3.57)	6 (11.32)		
Overall satisfaction	46 (82.15)	34 (64.15)	4.514	0.034

recent years throughout the world [15]. BC has no obvious symptoms in the early stage due to its early pathological characteristics, so patients are prone to ignore it, resulting in untimely treatment and poor prognosis [16], which seriously threatens the physical and mental health of women. Radical mastectomy is currently the most commonly used clinical treatment for BC [17], which can provide relatively high efficacy. However, due to the need to remove the entire breast tissue, radical mastectomy had difficulty in meeting the needs of young women for wanting a beautiful body. In recent years, breast-conserving surgery has been used increasingly, and it is suitable for BC patients in the early or middle

stages [18], which can maintain the breast integrity of patients to the greatest extent, but postoperative adjuvant radiotherapy and chemotherapy are still needed for consolidating the efficacy. Lymphedema on the affected side is a common complication after BC surgery, and upper limb lymphedema will bring about severe physiological and psychological burden to patients, and will also compromise their prognosis and life quality. In recent years, scholars have done a lot of research on postoperative upper limb lymphedema [19, 20], but there is still little research on how to carry out nursing for it. Therefore, it is still unknown how to determine the most optimal nursing method for BC patients treated with radiotherapy and chemotherapy after breast-conserving therapy. In this study, the effects of cluster nursing on BC patients after surgery were analyzed, which is of great significance for the clinical diagnosis and nursing of BC patients in the future.

The results of this study showed that the incidence of lymphedema in the control group nursed under the routine nursing mode was significantly higher than that in the research group nursed with the cluster nursing mode; and that the limb movement ability of patients in the control group was also worse than that of patients in the research group, indicating that cluster nursing has extremely high application value for lymphedema after BC surgery. The results are consistent with the result in the study by Tufts L S et al. [21] that cluster nursing has reduced complications after liver and large intestine resection, which can support the results of this study. We speculated that the reason why the incidence of lymphedema in the research group was better than that in the control group may be that cluster nursing improved the function of affected limbs and promoted the rehabilitation of patients through a series of evidence-based nursing measures, health education, dietary nursing, and especially postoperative rehabilitation exercise guidance. One study by Lee D et al. [22] has revealed that lymphedema affects the emotions and cognition of patients to varying degrees and another study by Zhang J J et al. [23] has also pointed out that postoperative radiotherapy affects the role function and social function of patients. Further comparison of the psychological state of the two groups showed that the HAMD and HAMA scores of the research group were signifi-

cantly lower than those of the control group, and the PSQI score of the research group was also lower than that of the control group, implying that cluster nursing can effectively improve the psychological state and sleep quality of BC patients. During radiotherapy and chemotherapy after surgery, cancer patients usually suffer from negative emotions such as irritability and anxiety due to fear of the disease, confusion about the future, and anxiety about treatment results [24, 25]. Under cluster nursing, members of the nursing group are arranged to answer questions from patients professionally, which soothes the anxiety of the patients, enables them to establish a positive and optimistic state of mind and receive treatment at ease; and also improves the relationship between doctors and patients and increases the trust of patients in the medical personnel. In this study, the nursing satisfaction of the research group was significantly higher than that of the control group, which verifies that cluster nursing has a high implementation value in BC, and it can effectively improve the overall impression of medical staff to the patients and reconcile doctor-patient conflicts. Moreover, the life quality survey results showed that the life quality scores of the research group were all better than those of the control group in addition to cognitive function and disease recurrence that presented no difference between the two groups, which also suggests that cluster nursing has certain effects on the improvement of the life quality of the patients after discharge.

In this study, there are many deficiencies due to the limitation of experimental conditions. For example, there are many nursing methods in clinical practice, but this study has only focused on exploring the application of cluster nursing, and it is not sure whether other nursing methods have the same clinical effect. In the future, we will conduct more comprehensive research on this point, so as to obtain the best research results.

To sum up, cluster nursing can effectively reduce upper limb lymphedema in patients treated with radiotherapy and chemotherapy after breast-conserving therapy, and can also promote the recovery of upper limb function of the patients and improve their psychological state and postoperative quality of life.

Disclosure of conflict of interest

None.

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