

ORIGINAL RESEARCH

Effects of Chinese medicine comprehensive care combined with art painting therapy in upper limb lymphedema and shoulder joint mobility after breast cancer surgery

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Abstract

This study aimed to examine the effects of a Chinese medicine-based comprehensive nursing program combined with art painting therapy on upper limb lymphedema and shoulder joint mobility after breast cancer surgery. 60 patients who visited our hospital from July to December 2022 were selected as a control group while 60 patients who were admitted to our hospital between January and June 2023 were selected as observational group. Compared to the control group using conventional interventions, the observational group applied a Chinese medicine comprehensive nursing program combined with an art painting therapy intervention. The shoulder joint function of both groups before intervention and after 2, 4 and 8 weeks after intervention was compared. Constant-Murley Shoulder Outcome Score (CMS), postoperative shoulder joint mobility, and upper limb lymphedema incidence were measured in both groups 8 weeks after intervention. The observational group's CMS was significantly higher than the control group after 2, 4 and 8 weeks after intervention ($p < 0.05$). The observational group's shoulder joint mobility was significantly higher than in the control group. A significantly lower incidence of postoperative lymphedema was observed in the observational group 8 weeks after intervention compared to the control group ($p < 0.05$). In summary, the Chinese medicine comprehensive nursing program combined with art painting therapy after breast cancer surgery enhances patients' shoulder joint function recovery, reduces upper limb dysfunction, and reduces upper limb lymphedema.

Keywords

Breast cancer survivor; Traditional Chinese medicine comprehensive nursing care; Art painting therapy; Shoulder function

1. Introduction

Breast cancer is one of the most common cancers in women, accounting for approximately 2.3 million new cases per year and 11.7% of all cancer cases globally [1]. Annually, breast cancer causes 685,000 deaths, constituting 6.9% of global cancer-related deaths [2]. Breast cancer prevalence and survival rates increased significantly in recent years [3]. Among the most common side effects of treatment for breast cancer survivors (BCS), shoulder functional difficulties include reduced range of motion (ROM), stiffness, weakness and discomfort [4]. One year after axillary lymph node dissection, 32.9% of patients reported ROM, while 51.1% reported pain and numbness two years after breast cancer surgery [3, 5]. Besides affecting daily activities and quality of life, shoulder functional complications increase healthcare burdens [6]. Integrated Chinese medicine care (herbal treatment, acupuncture, tuina massage, dietary therapy, qigong and psychotherapy)

balances the body's *qi* and blood, *yin* and *yang*, promotes self-healing ability, and enhances quality of life [7]. Art painting therapy has good results for breast cancer recovery [8]. Comprehensive nursing plan of traditional Chinese medicine combined with painting art treatment, which combines TCM integrative care with art painting therapy, is designed to promote overall physical and mental health, positively impacting patients with shoulder dysfunction in increased ROM, improved functional scores, and decreased pain scores [9]. The therapy presents an innovative and novel approach to breast cancer rehabilitation. It emphasizes the uniqueness of integrating traditional Chinese medicine treatments with creative arts therapies, providing a new approach to improve patients' quality of life and promote physical and mental health. This study investigated the effect of this therapy on upper limb lymphedema and shoulder mobility after breast cancer surgery.

2. Information and methodology

2.1 Study data

60 patients who visited our hospital from July to December 2022 were included in the control group. 60 patients admitted to our hospital between January and June 2023 were included in the observational group. Compared to the control group using conventional interventions, the observational group applied Chinese medicine integrated care combined with art painting therapy interventions.

Inclusion criteria:

(1) women aged ≥ 18 years. (2) first clinical diagnosis of breast cancer by imaging and/or pathology. (3) undergoing radical mastectomy treatment for breast cancer at our hospital. (4) no distant metastasis (5) informed consent of patients.

Exclusion criteria:

(1) suffers from severe cardiovascular disease. (2) history of mental illness and cognitive impairment, unable to communicate normally. (3) lacks patient compliance, unwilling to cooperate with nurses.

Control group: age (47.73 ± 5.68); educational level: junior high school and below 29 (48.3%), high school and above 16 (26.7%), college and above 15 (25%); site of the affected limb: left 21 (35%), right 39 (65%). Observational group: age (48.32 ± 6.24) educational level: junior high school and below 23 (38.3%), high school and above 22 (36.7%), college and above 15 (25%); site of the affected limb: left 28 (46.7%), right 32 (53.3%). General data of patients between both groups did not differ significantly ($p > 0.05$).

2.2 Research methods

2.2.1 Research methods of the control group

Conventional rehabilitation training:

Phase 1: Primary rehabilitation (1–2 weeks after surgery)

Deep breathing exercises: to promote lung capacity and airway patency. Shoulder mobility training: Raise and lower the shoulder slowly without force, to maintain shoulder joint mobility. Upper extremities passive mobilization: Rehabilitation therapists may assist with gentle passive joint mobilization to prevent joint stiffness.

Phase 2: Intermediate Rehabilitation (2–6 weeks)

Shoulder mobility training: Gradually increase active shoulder movements like rotation and lifting, avoiding hyperextension or twisting. Arm elevation: Start mildly and increase the height gradually. Lymphatic drainage: Reduce edema through gentle lymphatic drainage techniques, performed by a professional lymphatic therapist.

Phase 3: Advanced Rehabilitation (after 6 weeks)

Strength Training: incorporate light resistance training gradually to strengthen the upper limb muscles. Balance and Coordination: Reduce injury risk by improving muscle control through balance and coordination exercises. Flexibility: Deep stretching and flexibility exercises improve joint mobility. Rehabilitation bands: Enhance strength and mobility with a variety of upper body exercises using specialized rehabilitation bands.

2.2.2 Research methods of the observational group

2.2.2.1 Research training team formation

A doctor, a traditional Chinese medicine (TCM) physician, one nurse on duty, an oncology department's head nurse, a rehabilitation trainer, and a psychological counselor (specializing in drawing psychology) comprised the team. Breast cancer surgery and diagnosis were performed by the doctor. TCM therapies such as acupuncture, herbal therapy, tuina and massage were administered by the TCM physician. The nurse on duty supervised the intervention program implementation. The head nurse coordinated departmental coordination. The rehabilitation therapist conducted shoulder functional exercises. In addition, the psychological counselor implemented a psychological intervention program. Team members received unified training, clarified their respective responsibilities, and met regularly for group summaries.

2.2.2.2 Training program development

(1) TCM theory formed the basis of this care plan. To balance the body's *qi* and blood, *yin-yang*, alleviate disease symptoms and promote recovery, customized comprehensive care plans were implemented, such as acupuncture, herbal medicine and acupuncture massage.

(2) Combining the 4-level therapeutic model of mandala painting in conjunction with shoulder joint exercises for women with breast cancer, a functional exercise program was developed for art painting with the upper limbs on the affected side.

2.2.2.3 Comprehensive rehabilitation care using Chinese medicine

In Chinese medicine, upper limb lymphedema after breast cancer surgery is considered "edema" and "pulse paralysis".

(1) Acupuncture and moxibustion therapy: Acupuncture and moxibustion treatments stimulate blood circulation in the upper and lower body. Medium-strength acupuncture uses the laxative technique, and the needles are injected into the body to a certain depth, followed by twists until meridians points are swollen and painful. (2) TCM therapy: Chinese medicinal preparations such as *Panax ginseng*, *Angelica sinensis* and *Astragalus* were used to treat postoperative upper limb lymphoedema after breast cancer surgery.

(3) Acupuncture point massage: Knead and press the *Hegu* point and the *Neiguan* point for 2–3 min. Foot moxibustion is performed once daily for 15 min. Knead at the shoulder acupoint for 3–5 min while applying pressure with index and middle fingers.

2.2.2.4 Training program implementation

An early functional training program that incorporates elements of emotional expression and rehabilitation is designed to reduce upper extremity lymphedema and improve shoulder mobility for postoperative breast cancer patients. It is based on the four-level treatment model of mandala painting.

(1) Level 1—Perceptual Experience: (i) Diary Recording: Encourage patients to keep a daily journal, including their experience of upper extremity lymphedema, pain level and emotional response. (ii) Drawing: Encourage patients to draw

briefly each day to express emotions and experiences.

(2) Level 2—Body Perception: 1 Body Schematic Drawing: Patients might better understand their bodies by drawing a body schematic that highlights lymphedematous areas and shoulder joint health. 1 Mandala Drawing: Mandalas were drawn by patients and used as symbols of physical and emotional balance to increase recovery confidence.

(3) Level 3—Inner Balance: 1 Deep Breathing Exercises: Patients were taught deep breathing exercises to reduce lymphedema and relax their shoulders. 1 Meditation and Painting: Meditation and painting can both help patients achieve inner balance.

(4) Level 4—Social Interaction: 1 Rehabilitation Group Painting Sessions: Breast cancer survivors can share their emotions and recover through painting sessions as part of an interactive recovery support system. 1 Rehabilitation training: Lymphedema relief and shoulder mobility enhancement (Table 1).

2.3 Observational indicators

Evaluators were measured at baseline (T0) and 2 weeks (T1), 4 weeks (T2) and 8 weeks (T3) after surgery.

2.3.1 The constant-Murley shoulder outcome score (CMS) [10]

A total score of 100 points is determined by 15 points for pain, 20 points for daily living activities ability, 40 points for shoulder mobility (forward flexion, abduction, external rotation and internal rotation mobility, each worth 10 points), and 25 points for muscle strength. Higher scores indicate better functional recovery of the upper limb, and the Cronbach's Alpha coefficient was 0.827.

2.3.2 Range of motion (ROM)

A medical joint protractor was used to measure shoulder joint mobility of both groups before and after the intervention in terms of forward flexion, abduction, backward extension, and internal retraction. It was repeated twice, and an average value

was calculated.

2.3.3 Lymphedema

Both groups were assessed for lymphedema after 8 weeks of intervention, and the differences in bilateral circumferential diameter were compared. Lymphedema was divided into mild edema (≥ 2 cm), moderate edema (≥ 4 cm), and severe edema (≥ 6 cm). Total incidence rate of edema = (number of mild + moderate + severe edema cases)/total number of cases \times 100%.

2.3.4 Cancer-related fatigue (CRF)

No fatigue as 0 points, mild fatigue as 1–3 points, moderate fatigue as 4–6 points, and severe fatigue as 7–10 points. Incidence rate of fatigue = (mild + moderate + severe)/total number of cases \times 100%.

2.4 Statistical methods

The statistical analysis was conducted using SPSS 25.0 (IBM SPSS Statistics 25.0, IBM Corporation, Armonk, NY, USA). Measurement data were expressed as mean \pm standard deviation ($\bar{x} \pm s$). Two independent sample *t*-tests were conducted for group comparison. Count data were expressed as frequency and percentage. The χ^2 test was used to compare groups. The difference was statistically significant at $p < 0.05$.

3. Results

3.1 Shoulder function rating scale

Before the intervention, pain, activities of daily living (ADL), ROM, muscle strength, and total score of both groups did not differ significantly ($p > 0.05$). 2 weeks after the intervention, there were no significant different in pain, ADL and ROM, while muscle strength differed significantly ($p < 0.05$). 4 and 8 weeks after the intervention, there were no significant differences in pain, ADL, ROM, muscle strength, and total score between both groups ($p < 0.05$) (Table 2).

TABLE 1. Rehabilitation training programs.

Item	Training content	Objectives	Frequency	Time
Lymphatic drainage exercises	Provide patients with lymphatic drainage practice drills that include gentle arm movements and massage to promote lymphatic fluid flow.	Reduce upper limb lymphedema and promote lymphatic drainage	2/d	20 min
Passive shoulder mobilization	The rehabilitator assists patients in performing passive shoulder activities including rotation, lifting and extension.	Prevent shoulder joint stiffness and gradually increase shoulder joint mobility.	2/d	20 min
Active shoulder mobilization	Gradually introduce the patient to active shoulder activities on his or her own, such as shoulder rotation and lifting.	Increase shoulder joint mobility and restore shoulder function.	1/d	20 min
Resistance band exercises	Perform upper extremity strength exercises using resistance bands, including flexion and extension movements.	Enhance muscle strength and improve function of the upper limb.	1/d	20 min
Flexibility exercises	Shoulder stretching and muscle relaxation exercises.	Improve joint mobility and reduce muscle tension.	1/d	20 min

TABLE 2. Comparison of the postoperative functional recovery status of the affected limbs between the two groups ($\bar{x} \pm s$).

Groups	Number of cases	Before treatment	2 weeks after treatment	4 weeks after treatment	8 weeks after treatment
Pain (score)					
Control group	60	5.78 ± 1.23	7.73 ± 1.28	9.17 ± 0.97	12.30 ± 0.97
Observational Group	60	5.15 ± 1.19	7.43 ± 1.23	10.88 ± 1.28	13.65 ± 1.03
<i>t</i>		2.133	2.379	-8.698	-7.390
<i>p</i>		0.789	0.778	0.013	0.045
ADL (score)					
Control group	60	6.45 ± 0.62	8.49 ± 0.63	11.49 ± 0.84	14.80 ± 0.73
Observational Group	60	6.37 ± 0.53	8.63 ± 0.68	12.08 ± 0.79	16.80 ± 0.93
<i>t</i>		0.812	-1.132	-3.964	-13.047
<i>p</i>		0.117	0.361	0.046	0.005
ROM (score)					
Control group	60	12.86 ± 1.12	19.87 ± 1.06	25.59 ± 0.99	33.70 ± 0.96
Observational Group	60	12.56 ± 0.96	20.97 ± 1.17	27.04 ± 1.15	35.84 ± 1.45
<i>t</i>		1.575	-5.395	-7.384	-9.939
<i>p</i>		0.127	0.314	0.303	0.001
Muscle strength (score)					
Control group	60	7.63 ± 0.96	10.86 ± 1.12	13.86 ± 1.42	17.69 ± 1.86
Observational Group	60	7.59 ± 0.96	11.94 ± 1.90	14.98 ± 2.05	19.54 ± 2.55
<i>t</i>		0.190	-3.750	-3.621	-4.532
<i>p</i>		0.870	0.001	0.001	0.004
Total scores (score)					
Control group	60	32.60 ± 2.02	47.06 ± 1.86	59.94 ± 2.15	78.29 ± 2.51
Observational Group	60	32.67 ± 2.00	48.88 ± 2.73	64.87 ± 2.75	85.73 ± 3.56
<i>t</i>		2.312	-4.260	-10.907	-13.213
<i>p</i>		0.988	0.002	0.110	0.003

3.2 Comparison of shoulder joint mobility between the two groups

There was a statistically significant difference in shoulder joint mobility between both groups before intervention and after 2 weeks, 4 weeks and 8 weeks after intervention ($p < 0.05$) (Table 3).

3.3 Comparison of post-intervention lymphedema between the two groups

The incidence of upper limb lymphedema between both groups after 8 weeks of intervention differed significantly ($p < 0.05$) (Table 4).

3.4 Comparison of CFR between the two groups after intervention

The incidence of cancer-related fatigue between both groups after 8 weeks of intervention differed significantly ($p < 0.05$) (Table 5).

TABLE 3. Comparison of postoperative shoulder joint mobility between the two groups ($\bar{x} \pm s$).

Groups	Number of cases	Anteflexion				Back extension			
		Before intervention	2 weeks after intervention	4 weeks after intervention	8 weeks after intervention	Before intervention	2 weeks after intervention	4 weeks after intervention	8 weeks after intervention
Control group	60	91.52 ± 10.42	100.12 ± 11.23	121.16 ± 13.45	131.10 ± 15.38	30.69 ± 5.16	32.56 ± 4.56	35.16 ± 3.78	38.68 ± 4.12
Observational Group	60	91.53 ± 10.43	116.15 ± 17.20	138.45 ± 14.52	150.46 ± 16.47	30.66 ± 5.15	37.52 ± 3.79	45.43 ± 4.32	49.45 ± 4.84
<i>t</i>		0.049	0.556	5.663	7.336	0.324	2.556	7.816	13.266
<i>p</i>		0.996	0.007	0.001	0.001	0.974	0.001	0.001	0.001
		Abductor				Adductor			
		Before intervention	2 weeks after intervention	4 weeks after intervention	8 weeks after intervention	Before intervention	2 weeks after intervention	4 weeks after intervention	8 weeks after intervention
Control group	60	61.32 ± 5.33	80.91 ± 5.66	100.36 ± 3.77	136.25 ± 12.12	18.35 ± 2.67	20.41 ± 2.32	24.57 ± 7.18	27.28 ± 3.25
Observational Group	60	61.34 ± 5.27	91.34 ± 7.89	140.37 ± 7.43	172.35 ± 10.34	18.46 ± 2.57	26.63 ± 6.19	32.32 ± 4.13	38.64 ± 5.26
<i>t</i>		0.234	5.613	11.556	19.717	0.220	1.346	7.245	17.798
<i>p</i>		0.816	0.002	0.001	0.001	0.492	0.001	0.001	0.001

TABLE 4. Comparison of lymphedema in the two groups after 8 weeks of intervention (cases).

Groups	Number of cases	None	Mild edema	Moderate edema	Severe edema	Total incidence of edema
Control group	60	41 (68.3%)	15 (25.0%)	3 (5.0%)	1 (1.7%)	19 (31.7%)
Observational Group	60	51 (85.0%)	8 (13.3%)	1 (1.7%)	0 (0%)	9 (15.0%)
χ^2						4.658
<i>p</i>						0.031

TABLE 5. Comparison of CFR between the two groups of patients after 8 weeks of intervention (%).

Groups	Fatigue				Incidence of fatigue
	None	Mild	Moderate	Severe	
Control group	4 (6.7%)	15 (25.0%)	33 (55.0%)	8 (13.3%)	56 (93.3%)
Observational Group	16 (26.7%)	25 (41.7%)	17 (28.3%)	2 (3.3%)	44 (73.3%)
χ^2	8.640	3.750	8.777	3.927	8.640
<i>p</i>	0.003	0.050	0.003	0.048	0.003

4. Discussion

4.1 Traditional Chinese medicine comprehensive nursing program combined with art painting therapy benefits the functional recovery of affected limbs

Breast cancer surgery affects ROM and shoulder strength in a significant way, which is one of the most common postoperative complications in breast cancer patients [11–13]. Statistically significant differences were found between the two groups in functional status recovery of the affected limbs of the two groups at 4 weeks after the intervention and 8 weeks after the intervention ($p < 0.05$). Chinese medicine emphasizes the holistic concept, which holds that health is closely related to emotions, mentality, the environment and many other factors. Art painting therapy helps improve patients' psychological state and restores the balance of *qi*, and *yin-yang* in the body, promoting limb recovery [14]. Chinese medicine believes that *qi* and blood flow through the meridians. Meticulous movement through painting can promote smooth flow through the meridians, which helps relieve pain and improve limb function. Our findings are consistent with findings from previous studies [15], showing that upper limb functional exercises based on isometric and plyometric training combined with art painting therapy could reduce pain and shoulder mobility after breast cancer surgery. Therefore, TCM comprehensive care combined with art painting therapy enhances limb function recovery, pain relief, muscle strength enhancement, and self-care abilities.

4.2 Traditional Chinese medicine comprehensive nursing program combined with art painting therapy improves patients' shoulder joint mobility

Breast cancer survivors' survival rates are influenced by functional dysfunction independently [16, 17]. In one study, 63% of patients reported numbness in the upper body after surgery,

35% had obvious swelling, 13%~15% reported different degrees of pain, and 1%~4% reported shoulder abduction limitations and muscle weakness [18]. Shoulder dysfunction and pain during exercise severely affect patients' compliance with functional exercise and negatively affect their psychological well-being [19]. Shoulder joint mobility in the observational group after the intervention was significantly higher than in the control group ($p < 0.05$). This is due to the fact that painting requires fine hand movements and coordination. This helps exercise the affected limbs and builds muscle strength and coordination. Art painting can provide a low-intensity activity in the early stages of rehabilitation, allowing patients to gradually rebuild shoulder muscle strength and flexibility [20]. Through rehabilitation exercises and hand coordination, the TCM integrated care program combined with art painting therapy can help postoperative breast cancer patients improve shoulder mobility.

4.3 Effective prevention of upper extremity lymphedema and cancer-caused fatigue by TCM comprehensive care program combined with art painting therapy

Upper extremity lymphedema in breast cancer is a chronic progressive disease caused by fluid accumulation in the interstitial space as a result of damage to lymph nodes during axillary dissection and radiation [21]. Exercise, a planned, structured, and repetitive activity, prevents and treats upper limb lymphedema [15, 22]. Upper extremity lymphedema is diagnosed by measuring the wrist, 15 cm below the axilla, and 10 cm above the axilla, with either circumferential diameter exceeding the healthy side by 2 cm [23]. In this study, statistically significant differences were observed between groups in ($p < 0.05$). It is primarily due to hand movements and shoulder activities in art painting therapy that encourage lymphatic fluid flow, which prevents upper limb lymphedema [7]. A certain amount of hand and shoulder movement is required when painting. It increases blood circulation in the shoulders and upper extrem-

ities, improves muscle strength, and reduces fatigue [24, 25]. According to Chinese medicine, emotions are closely related to *qi* and blood flow. Art painting therapy can help balance emotions, reduce anxiety and depression, promote smooth *qi* and blood flow, reduce lymphedema and fatigue. Several studies have shown [26] that the treatment mode combined with art painting therapy is significantly superior to simple rehabilitation training, which is consistent with our findings.

5. Conclusions

This study first revealed the potential benefits of this treatment in rehabilitation by investigating the effects of a TCM-based comprehensive care program combined with art painting therapy on upper extremity lymphedema and shoulder mobility in postoperative breast cancer patients. However, this study has limitations, including a small sample size and a single-center design. To assess the efficacy and generalizability of this treatment, larger sample sizes and multicenter designs are recommended in further studies to validate and consolidate the current findings. Future in-depth research should also include long-term observation and follow-up of efficacy, as well as comparative studies with other rehabilitation tools.

AVAILABILITY OF DATA AND MATERIALS

The authors declare that all data supporting the findings of this study are available within the paper and any raw data can be obtained from the corresponding author upon request.

AUTHOR CONTRIBUTIONS

JL, YLS, LSW and XQF—designed the study and carried it out. JL, YLS and LSW—supervised the data collection, analyzed the data; prepared the manuscript for publication and reviewed the draft of the manuscript. JL and YLS—interpreted the data. All authors have read and approved the manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval was obtained from the Ethics Committee of The Second Affiliated Hospital of Zhejiang University School of Medicine (Approval no. IRB-2022-0899). Written informed consent was obtained from a legally authorized representative(s) for anonymized patient information to be published in this article.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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