

Effects of Traditional Chinese Medicine-Based Nursing Techniques on Postoperative Wound Pain in Patients Undergoing Open Thoracic Surgery

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Abstract

Objective: To investigate the effects of traditional Chinese medicine (TCM)-based nursing techniques on postoperative wound pain in patients undergoing open thoracic surgery, and to provide evidence for optimizing clinical nursing care. **Methods:** A total of 220 patients who underwent open thoracic surgery between 2024 and 2025 were enrolled and randomly assigned to an experimental group (n = 110) or a control group (n = 110). The control group received routine postoperative nursing care, whereas the experimental group received additional TCM-based nursing interventions, including acupoint application, moxibustion, and auricular acupressure. Postoperative pain intensity at different time points, analgesic consumption, wound recovery-related outcomes, and adverse events were compared between the two groups. **Results:** Visual analog scale (VAS) pain scores in the experimental group were significantly lower than those in the control group from 12 hours postoperatively onward (P < 0.05). The experimental group also showed significantly fewer administrations and a lower total dose of analgesic medication compared with the control group (P < 0.05). In addition, the experimental group demonstrated a shorter time to resolution of wound swelling, less wound exudation, and a higher rate of primary wound healing (P < 0.05). **Conclusion:** TCM-based nursing techniques can effectively alleviate postoperative wound pain in patients undergoing open thoracic surgery, reduce the need for analgesic medication, and promote wound recovery.

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Keywords

Traditional Chinese Medicine-Based Nursing, Thoracic Surgery, Open Thoracotomy, Postoperative Wound Pain, Wound Healing

1. Introduction

Open thoracic surgery remains a commonly used surgical approach for the treatment of various thoracic diseases. However, due to its high invasiveness and extensive surgical incision, it is often associated with substantial postoperative tissue injury and inflammatory responses, resulting in varying degrees of wound pain and delayed healing [1]. Previous studies have shown that postoperative wound recovery after thoracotomy is influenced by multiple factors, including patient age, underlying comorbidities, local microcirculatory status, and perioperative nursing care. Inadequate pain control may restrict respiratory excursion, suppress effective coughing, and limit early mobilization, thereby exacerbating local inflammatory responses and delaying wound healing [2]-[4].

In routine clinical practice, postoperative nursing care following thoracic surgery primarily focuses on wound dressing changes, infection prevention, and pharmacological analgesia. Although these measures can partially relieve symptoms, they are often accompanied by drug-related adverse effects and provide limited regulation of the wound microenvironment [5]. Traditional Chinese medicine (TCM) nursing theory emphasizes holistic regulation and syndrome-based care, proposing that stimulation of specific acupoints may improve local blood circulation and tissue metabolism through modulation of meridians and qi-blood balance. In recent years, TCM-based nursing techniques, such as acupoint application and moxibustion, have increasingly been incorporated into perioperative care and have shown potential benefits in postoperative pain relief and recovery enhancement [6].

Importantly, postoperative pain is not merely a subjective discomfort but is closely associated with local inflammatory responses, microcirculatory disturbances, and wound healing quality [7] [8]. Therefore, effective pain management may concurrently influence wound recovery. However, systematic evidence regarding the combined effects of TCM-based nursing techniques on postoperative pain control and wound healing in patients undergoing open thoracic surgery remains limited. Accordingly, this study aimed to evaluate the effects of TCM-based nursing interventions on postoperative wound pain, analgesic consumption, and wound recovery, with the goal of providing clinical evidence for optimizing postoperative nursing strategies in thoracic surgery.

2. Materials and Methods

2.1. Participants

A total of 220 patients who underwent open thoracic surgery in the Department

of Thoracic Surgery of our hospital between February 2024 and February 2025 were enrolled. Using a random number table, patients were assigned to either the experimental group (n = 110) or the control group (n = 110).

In the experimental group, there were 62 males and 48 females, aged 28 - 70 years (mean \pm SD: 52.34 \pm 8.67 years), with disease duration ranging from 2 to 24 months (11.45 \pm 3.28 months). The control group included 60 males and 50 females, aged 30 - 72 years (53.12 \pm 9.05 years), with disease duration of 3 - 26 months (12.02 \pm 3.56 months). No significant differences were observed between the two groups in terms of sex, age, or disease duration ($P > 0.05$), indicating baseline comparability. Patients were randomized using a computer-generated sequence prepared by an independent researcher. Allocation was concealed with sequentially numbered, sealed, opaque envelopes opened after enrollment. Outcome assessors were not involved in the intervention and were blinded to group assignment.

This study was approved by the Institutional Ethics Committee of The First People's Hospital of Jingzhou City. Written informed consent was obtained from all participants prior to enrollment. The ethics approval ID was not available.

2.2. Inclusion and Exclusion Criteria

Inclusion criteria:

Indication for open thoracic surgery and first-time thoracotomy.

Age between 18 and 75 years.

Clear consciousness, adequate communication ability, and the capacity to accurately report pain.

Written informed consent provided.

Exclusion criteria:

Severe dysfunction of vital organs (heart, liver, or kidney).

History of psychiatric illness or cognitive impairment.

Known allergy to any TCM-based nursing intervention used in the study.

Long-term preoperative use of analgesics or medications affecting pain perception.

Receipt of other interventions within 3 months that could influence pain outcomes.

Terminal-stage malignancy with inability to complete the study protocol.

2.3. Interventions

2.3.1. Routine Nursing Care (Control Group)

Patients in the control group received standard postoperative thoracic nursing care, including airway maintenance, regular repositioning, continuous vital sign monitoring, respiratory exercises, assisted sputum expectoration, and pharmacological pain management. When the VAS score was ≥ 4 , tramadol hydrochloride (100 mg, intramuscular injection) was administered under physician guidance, with a minimum interval of 6 hours and a maximum daily dose of 400 mg.

2.3.2. TCM-Based Nursing Interventions (Experimental Group)

In addition to routine care, the experimental group received TCM-based nursing interventions:

Acupoint application:

Herbal analgesic patches (containing *Corydalis yanhusuo*, *Angelica dahurica*, and *Ligusticum chuanxiong*, 0.5 g crude drug per patch) were applied to Tanzhong (CV17), Neiguan (PC6), and Zusanli (ST36) starting 6 hours postoperatively, once daily for 6 hours, for 7 consecutive days.

Moxibustion:

Mild moxibustion was applied to Hegu (LI4) and Taichong (LR3) starting 24 hours postoperatively, 15 minutes per acupoint, twice daily for 7 days.

Auricular acupressure:

Vaccaria seeds were applied to auricular points Shenmen, Lung, and Chest starting 48 hours postoperatively. Patients were instructed to press each point for 1 minute, five times daily, with seeds replaced every 3 days for a total of 7 days.

2.3.3. Perioperative Analgesia Standardization

Both groups received the same standardized perioperative analgesia protocol. No regional nerve blocks, patient-controlled analgesia (PCA), or additional sedative regimens were administered during the study period. Pharmacological analgesia was provided according to the same clinical criteria in both groups to minimize potential confounding effects.

2.4. Outcome Measures

Postoperative pain intensity was assessed using the visual analog scale (VAS). Patients were instructed by uniformly trained nurses to perform self-assessment, and the scores were recorded to evaluate wound pain at different postoperative time points. Assessments were conducted at 6 h, 12 h, 24 h, 48 h, 72 h, and 7 days after surgery. The VAS score ranged from 0 to 10, with higher scores indicating more severe pain. VAS scores were assessed under resting conditions. Patients were instructed to rate their pain without coughing or movement to ensure consistency across time points.

Nurses recorded the total number of administrations and the cumulative dose of postoperative analgesic medication (tramadol hydrochloride injection) used by patients in both groups within 7 days after surgery.

Wound recovery-related outcomes were observed and recorded by nurses, including the time to resolution of wound swelling (defined as the disappearance of visible edema around the incision site with no tenderness on palpation), the amount of wound exudation, and wound healing grade. To ensure consistency, wound exudation was assessed by trained nursing staff over each 24-h period based on dressing saturation and recorded using predefined volume categories. Wound exudation was categorized as no exudation, mild exudation (24-h exudate volume < 5 mL), moderate exudation (24-h exudate volume of 5 - 10 mL), or severe exudation (24-h exudate volume > 10 mL). Wound healing was classified according to

internationally accepted criteria as Grade A healing (good wound healing without adverse reactions), Grade B healing (presence of inflammatory signs such as redness or induration without purulent discharge), or Grade C healing (purulent wound requiring incision and drainage).

Adverse events related to nursing interventions during the intervention period were documented by nurses, including skin allergic reactions at the site of acupoint application (e.g., redness, itching, or rash), skin burns at moxibustion sites, and skin damage at auricular acupressure sites. The incidence of adverse events was calculated for both groups.

2.5. Primary Endpoint and Sample Size Consideration

The primary endpoint of this study was postoperative pain intensity measured by the visual analog scale (VAS) at 48 hours after surgery. This time point was selected because postoperative inflammatory response and wound-related pain typically peak within the first 48 hours following open thoracotomy.

The sample size was determined based on preliminary clinical observations and feasibility within the study period. With 110 patients per group, the study was considered adequately powered to detect clinically meaningful differences in VAS scores between groups.

2.6. Statistical Analysis

Statistical analyses were performed using SPSS 25.0. Continuous variables were expressed as mean \pm standard deviation and compared using independent-samples t tests. Categorical variables were expressed as percentages as n (%) and compared using chi-square tests or Fisher's exact test, as appropriate. Fisher's exact test was used when expected cell counts were <5 . A two-sided P value < 0.05 was considered statistically significant. P values are reported as $P < 0.001$ when applicable.

3. Results

3.1. Comparison of Postoperative Pain Scores between the Two Groups

Postoperative pain intensity was assessed using the visual analog scale (VAS) at multiple time points. As shown in **Table 1**, there was no significant difference in VAS scores between the two groups at 6 hours postoperatively ($P > 0.05$). However, from 12 hours after surgery onward, the VAS scores in the experimental group were significantly lower than those in the control group at all subsequent time points ($P < 0.05$). These findings indicate that the TCM-based nursing interventions were associated with sustained postoperative pain relief.

3.2. Comparison of Analgesic Consumption between the Two Groups

Analgesic consumption within 7 days postoperatively is summarized in **Table 2**. Compared with the control group, the experimental group required significantly

fewer administrations of analgesic medication and a lower cumulative dose of tramadol (both $P < 0.05$). This result suggests that patients receiving TCM-based nursing interventions had a reduced need for pharmacological analgesia.

Table 1. Comparison of postoperative pain scores (VAS) between the two groups at different time points.

Time points	Experimental group (n = 110)	Control group (n = 110)	t	P
6 hours after surgery	5.68 ± 1.02	5.72 ± 1.10	0.286	0.775
12 hours after surgery	4.95 ± 0.98	5.56 ± 1.05	4.372	<0.001
24 hours after surgery	4.12 ± 0.85	5.01 ± 0.92	6.835	<0.001
48 hours after surgery	3.25 ± 0.76	4.28 ± 0.88	8.361	<0.001
72 hours after surgery	2.56 ± 0.65	3.62 ± 0.75	9.542	<0.001
7 days after surgery	1.32 ± 0.48	2.15 ± 0.56	11.203	<0.001

Table 2. Comparison of postoperative analgesic consumption between the two groups.

Indicators	Experimental group (n = 110)	Control group (n = 110)	P
Total usage times (times)	2.15 ± 0.86	4.82 ± 1.35	<0.001
Total dosage (mg)	215.00 ± 86.00	482.00 ± 135.00	<0.001

3.3. Comparison of Wound Recovery-Related Outcomes between the Two Groups

As presented in **Table 3**, patients in the experimental group showed a significantly shorter time to resolution of wound swelling and a lower amount of wound exudation compared with those in the control group ($P < 0.05$). In addition, the proportion of primary wound healing (grade A healing) was significantly higher in the experimental group than in the control group ($P < 0.05$), indicating improved wound recovery.

Table 3. Comparison of wound recovery-related outcomes between the two groups.

Indicators	Experimental group (n = 110)	Control group (n = 110)	X ² /t	P
Wound swelling subsidence time (days)	3.25 ± 0.68	4.56 ± 0.82	12.365	<0.001
Wound exudate volume (cases)			6.823	0.033
No exudate	42 (38.18)	28 (25.45)		
A small amount of exudate	56 (50.91)	62 (56.36)		
A moderate amount of exudate	10 (9.09)	16 (14.55)		
A large amount of exudate	2 (1.82)	4 (3.64)		
Wound healing grade (cases)			7.254	0.027
Grade A healing	95 (86.36)	78 (70.91)		
Grade B healing	13 (11.82)	28 (25.45)		
Grade C healing	2 (1.82)	4 (3.64)		

3.4. Comparison of Adverse Events between the Two Groups

Adverse events related to nursing interventions are shown in **Table 4**. A small number of patients in the experimental group experienced mild local reactions, including transient skin redness and itching. All adverse events were mild, resolved spontaneously or after simple symptomatic management, and did not require discontinuation of the interventions. No serious adverse events were observed in either group. The overall incidence of adverse events was higher in the experimental group (6/110 vs 0/110; $P = 0.029$). All events were mild and self-limited.

Table 4. Comparison of adverse events between the two groups.

Types of adverse event	Experimental group (n = 110), n (%)	Control group (n = 110), n (%)	P
Skin allergy at the acupoint application site	3 (2.73)	0 (0.0)	
Skin burns at the moxibustion site	1 (0.91)	0 (0.0)	
Skin damage at the auricular acupressure site	2 (1.82)	0 (0.0)	
Total adverse events	6 (5.45)	0 (0.0)	0.029

Individual adverse events are presented descriptively due to small event numbers. P values were calculated using Fisher's exact test (two-sided) due to small cell counts.

4. Discussion

4.1. Effects of TCM-Based Nursing Techniques on Postoperative Pain in Patients Undergoing Open Thoracic Surgery

Previous studies have indicated that post-thoracotomy pain syndrome is closely associated with intercostal nerve injury. This type of pain involves both nociceptive and neuropathic components, in which surgical trauma stimulates local nerve endings and leads to severe postoperative pain [1] [8]-[10]. Postoperative pain not only affects patients' physical comfort but may also influence recovery through neuroendocrine stress responses [11] [12].

In the present study, VAS pain scores in the experimental group were significantly lower than those in the control group from 12 hours postoperatively and at all subsequent time points ($P < 0.05$). These findings suggest that the application of TCM-based nursing techniques can effectively alleviate postoperative wound pain. According to traditional Chinese medicine theory, acupoint application at Tanzhong (CV17) is believed to relieve chest oppression and regulate qi, Neiguan (PC6) has sedative and analgesic effects, and Zusanli (ST36) helps harmonize qi and blood. Moxibustion at Hegu (LI4) and Taichong (LR3) is thought to promote meridian circulation and relieve pain, while auricular acupressure targeting points such as Shenmen, Lung, and Chest may exert additional analgesic effects.

Previous research has demonstrated that acupoint stimulation can promote the release of endogenous analgesic substances such as endorphins, inhibit pain signal transmission, and reduce pain perception [13]. These findings are consistent with

the sustained decrease in pain intensity observed in the experimental group in this study, supporting the clinical value of TCM-based nursing techniques in improving postoperative pain outcomes.

4.2. Positive Effects of TCM-Based Nursing Techniques on Reducing Analgesic Use

Although analgesic medications are commonly used after open thoracic surgery to rapidly relieve pain, excessive or prolonged use may lead to adverse effects such as gastrointestinal discomfort and respiratory depression, thereby limiting early postoperative mobilization and functional recovery. The results of this study showed that both the total number of analgesic administrations and the cumulative dose were significantly lower in the experimental group than in the control group ($P < 0.05$), indicating that TCM-based nursing interventions may help reduce patients' reliance on pharmacological analgesia [14] [15].

The potential mechanism underlying this effect may involve continuous stimulation of specific acupoints through interventions such as acupoint application and moxibustion, which may establish relatively stable neuro-humoral regulatory pathways and enhance the activity of endogenous analgesic systems. This process may work synergistically with exogenous analgesic medications to improve pain control [16]. Such a combined intervention approach may prolong analgesic effects, reduce peak pain intensity, and decrease the frequency of drug administration.

Moreover, as TCM-based nursing techniques are non-pharmacological in nature, they may help avoid risks associated with drug accumulation and provide a safer pain management strategy. This approach aligns with the principles of enhanced recovery after surgery, which emphasize minimizing pharmacological intervention and promoting intrinsic recovery capacity, thereby highlighting the potential role of TCM-based nursing in postoperative rapid rehabilitation.

4.3. Mechanisms of TCM-Based Nursing Techniques in Promoting Postoperative Wound Recovery

Wound healing following open thoracic surgery involves multiple processes, including resolution of inflammation, granulation tissue formation, and epithelial regeneration. Among these processes, local microcirculatory status and immune function are key determinants of wound healing quality [17]. In this study, patients in the experimental group demonstrated faster resolution of wound swelling, reduced wound exudation, and a significantly higher rate of primary wound healing compared with those in the control group, suggesting a potential promotive effect of TCM-based nursing techniques on wound recovery.

Herbal components used in acupoint application may penetrate the skin and exert local effects such as promoting blood circulation and resolving blood stasis. The thermal effects of moxibustion may induce local vasodilation, increase tissue perfusion, and improve oxygen and nutrient delivery to the wound site. In addi-

tion, auricular acupressure may modulate immune balance through activation of vagal pathways, potentially enhancing macrophage phagocytic activity and fibroblast function, thereby accelerating necrotic tissue clearance and collagen synthesis [18]-[20].

Through this multi-target intervention approach, TCM-based nursing techniques may improve the wound microenvironment while enhancing intrinsic repair capacity, which is consistent with modern wound healing concepts emphasizing the combined roles of microcirculatory optimization and immune regulation.

4.4. Safety Analysis of TCM-Based Nursing Techniques in Clinical Application

The clinical application of TCM-based nursing techniques must be based on safety considerations. In this study, the incidence of adverse drug reactions in the experimental group was 5.45%; however, all events were mild local reactions that were controllable and reversible, with no impact on overall safety and no serious adverse effects observed.

Skin reactions related to acupoint application were mainly associated with herbal stimulation and individual skin sensitivity and could be minimized through pre-intervention allergy screening and by reducing application duration to 4 - 5 hours. Burns related to moxibustion were primarily attributed to improper distance control during the procedure; the use of thermostatic moxibustion boxes fixed approximately 3 cm above the acupoint can effectively prevent such events. Skin irritation caused by auricular acupressure was often related to excessive pressure, and instructing patients to adjust pressure to achieve a sensation of soreness without pain can reduce the risk of skin injury.

These findings indicate that, when performed according to standardized protocols, TCM-based nursing techniques are safe and effective. Given their non-invasive nature, these interventions may be suitable for repeated or longer-term use in postoperative patients.

4.5. Limitations

Several limitations of this study should be acknowledged. First, this was a single-center study with a relatively limited sample size, which may restrict the generalizability of the findings. Second, multiple TCM-based nursing techniques were applied as a combined intervention, making it difficult to distinguish the independent contribution of each component. Third, pain assessment relied primarily on the VAS, which, despite its widespread use, remains a subjective measure. Finally, follow-up was focused on the early postoperative period, and long-term effects on pain and wound recovery were not evaluated. Future multicenter studies with larger sample sizes, component-specific intervention designs, and extended follow-up periods are needed to further validate and expand upon these findings.

5. Conclusion

In summary, the findings of this study indicate that the integration of traditional Chinese medicine-based nursing techniques into routine postoperative care may provide beneficial adjunctive effects for patients undergoing open thoracic surgery. Compared with routine nursing alone, the combined application of acupoint application, moxibustion, and auricular acupressure was associated with reduced postoperative wound pain, decreased reliance on analgesic medication, and more favorable wound recovery-related outcomes. These interventions were generally safe and well tolerated when implemented under standardized nursing protocols. From a clinical nursing perspective, TCM-based nursing techniques represent a feasible and non-pharmacological complementary approach that may help optimize postoperative pain management and enhance recovery following thoracic surgery. Further multicenter studies with larger sample sizes and extended follow-up are warranted to confirm these findings and to clarify the underlying mechanisms.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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