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Application of Acupoint Moxibustion in the Treatment of Intraoperative Hypothermia in Patients Undergoing Thoracoscopic Pneumonectomy

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Abstract

Objective: To investigate the application effect of moxibustion acupoint patches on intraoperative hypothermia in patients undergoing thoracoscopic pneumonectomy. Methods: A total of 100 patients undergoing thoracoscopic pneumonectomy admitted to our hospital from June 2025 to November 2025 were selected and randomly divided into a control group and an experimental group (50 cases each) using a random number table. The control group received conventional thermal intervention, while the experimental group received moxibustion acupoint patches in addition to the control group. The changes in body temperature, surgical outcomes, and adverse events were compared between the two groups. Results: The experimental group showed higher body temperatures at 30, 60, 90 minutes, and at the end of surgery compared to the control group ($P < 0.05$). The experimental group required less volume of colloidal fluid and crystalloid infusion, had shorter recovery time, and exhibited lower incidence of intraoperative hypothermia, postoperative agitation, and shivering compared to the control group ($P < 0.05$). Conclusion: Moxibustion acupoint patches can stabilize intraoperative body temperature in patients undergoing thoracoscopic pneumonectomy, shorten postoperative recovery time, reduce the incidence of intraoperative hypothermia, and lower the risk of postoperative agitation and shivering.

Keywords

Acupoint Moxibustion, Acupoint Application, Thoracoscopic Surgery, Pulmonary Resection, Hypothermia

1. Introduction

Compared with open pneumonectomy, thoracoscopic pneumonectomy is characterized by minimal trauma, reduced blood loss, and faster recovery [1]. Postoperative hypothermia is a common clinical complication following thoracoscopic surgery [2]. Intraoperative hypothermia, defined as a core body temperature below 36˚C, occurs when patients are affected by multiple factors during the procedure [3]. Perioperative hypothermia is closely associated with anesthesia, surgical techniques, and the surgical environment, leading to decreased metabolism of general anesthetics, prolonged recovery time, chills, coagulation disorders, and extended hospital stays [4]. Perioperative hypothermia significantly impacts patients' quality of life, making the intervention of intraoperative hypothermia a critical aspect of perioperative care. Studies [5] indicate that the incidence of intraoperative hypothermia in thoracoscopic surgery reaches as high as 72.7%, surpassing that of other surgical procedures, highlighting its substantial clinical research significance. Currently, the prevention of intraoperative hypothermia primarily relies on active warming measures, such as the use of heating blankets, cotton quilts, and intravenous fluid warming, which help maintain normal body temperature and reduce the occurrence of hypothermia. However, conventional warming measures have limited overall efficacy, and the risk of hypothermia remains [6]. Moxibustion with moxa cones, a distinctive traditional Chinese medicine technique, innovates upon conventional moxibustion by integrating the effects of hot compress, magnetic therapy, moxibustion, and moxa wool far-infrared therapy. When applied to specific acupoints, it generates effective thermal stimulation, promoting warming of the meridians, dispelling cold, activating blood circulation, and regulating qi, thereby aiding in the maintenance of body temperature [7] [8]. In recent years, external treatments of Traditional Chinese Medicine (TCM), such as moxibustion and acupoint application, have been increasingly utilized in perioperative management, though intraoperative research remains relatively limited [9] [10]. Aici Moxibustion, which combines moxibustion with acupoint application, regulates body temperature by stimulating specific acupoints. Preliminary studies indicate its potential efficacy in preventing hypothermia, though further clinical validation is required. International research on TCM external therapies remains scarce, and the application and study of Aici Moxibustion acupoint application are also limited [11] [12]. Given these findings, this study aims to analyze the clinical effects of Aici Moxibustion acupoint application on hypothermia during thoracoscopic pneumonectomy.

2. Materials and Methods

2.1. General Information

A total of 100 patients undergoing thoracoscopic pneumonectomy admitted to Jingzhou First People's Hospital from June 2025 to November 2025 were selected and randomly divided into a control group and an experimental group (50 cases each) using a random number table. No statistically significant differences were

observed in baseline characteristics between the two groups ($P > 0.05$), indicating comparability. This study was approved by the hospital ethics committee.

2.2. Inclusion and Exclusion Criteria

Inclusion criteria: 1) Patients undergoing thoracoscopic pneumonectomy for the first time; 2) Age ≥ 18 years; 3) ASA classification II - III; 4) Patients with good expressive and comprehension abilities; 5) Normal coagulation function; 6) Voluntary participants in this study. Exclusion criteria: 1) Patients with bleeding disorders; 2) Patients with abnormal preoperative body temperature; 3) Patients with hepatic or renal failure; 4) Patients with hematologic diseases; 5) Patients with mental disorders; 6) Patients who refuse traditional Chinese medicine intervention.

2.3. Method

Both groups of patients underwent thoracoscopic pneumonectomy with endotracheal intubation and general anesthesia. The operating room temperature was maintained at 21˚C - 25˚C, and humidity at 30% - 60%. Preoperative antibiotics were administered as prescribed. During the procedure, intravenous fluids and blood transfusions were warmed to 37˚C using an infusion warming device. Routine intraoperative monitoring included heart rate, blood oxygen saturation, and blood pressure.

2.3.1. Control Group

Patients in the control group received routine thermal intervention, including preoperative, intraoperative, and postoperative thermal management. 1) Preoperative thermal management: Conduct preoperative patient visits to fully assess the patient's psychological state, introduce relevant knowledge about the operating room environment, surgical approach, and anesthesia method, and alleviate patient concerns to foster a positive attitude toward surgery. Set the operating room temperature to 21˚C - 25˚C and humidity to 30% - 60% 1 hour before surgery. During patient transfer to the operating room, use cotton blankets for warmth without exposing the body. Preheat the operating table with a warming blanket. 2) Intraoperative thermal management: Use an infusion warming device to heat the required irrigation solution to 37˚C, and cover exposed areas with small cotton blankets. 3) Postoperative thermal management: Immediately cover the patient with cotton blankets after surgery to ensure continued warmth.

2.3.2. Test Team

In addition to the control group, the experimental group received moxibustion acupoint patches: Prior to the surgery, the Yongquan points (located on the sole of the foot, in the deepest depression of the plantar surface when the foot is flexed and toes curled) and Taixi points (located on the medial side of the foot, in the depression between the medial malleolus and the heel tendon) were massaged first. Moxibustion acupoint patches were then applied to the selected acupoints

and left in place until the end of the surgery.

2.4. Observation Indicators

1) Body temperature changes: Compare the preoperative, intraoperative (at 30, 60, and 90 minutes), and postoperative body temperature changes between the two groups. 2) Surgical outcomes: Compare the volume of colloidal fluid and crystalloid fluid administered, as well as the recovery time, between the two groups. 3) Adverse events: Compare the incidence of intraoperative hypothermia, postoperative agitation, and chills between the two groups.

2.5. Statistical Analysis

Statistical analysis was performed using SPSS 26.0 software. Categorical data were described as case counts and percentages (%). The chi-square $\bar{x} \pm s$ test was used for (2) testing. Normally distributed quantitative data were expressed as mean ± standard deviation (SD). Between-group comparisons were conducted using the independent samples *t*-test, with $P < 0.05$ considered statistically significant.

3. Results

3.1. General Information

No statistically significant differences were observed in the baseline characteristics between the two groups ($P > 0.05$), indicating comparability. See Table 1.

Table 1. General data of patients in both groups.

project	Control group ($n = 50$)	Experimental group ($n = 50$)	t/χ^2 value	P value
Age (years)	59.92±9.15	59.52±12.26	0.185	0.854
BMI (kg/m^2)	23.23±3.15	22.25±3.44	1.472	0.144
ASA classify			1.169	0.280
II	18 (36%)	13 (26%)		
III	32 (64%)	37 (74%)		
Hypertension			0.735	0.391
Yes	18 (36%)	14 (28%)		
Deny	32 (64%)	36 (72%)		
Diabetes mellitus			0.379	0.538
Yes	5 (10%)	7 (14%)		
Deny	45 (90%)	43 (86%)		

3.2. Body Temperature Changes

The experimental group showed higher body temperature at 30, 60, and 90 minutes during surgery and at the end of the procedure compared to the control group, with statistically significant differences ($P < 0.05$), as shown in Table 2.

Table 2. Comparison of body temperature changes between the two groups ($\bar{x} \pm s$, ˚C).

Group	Number of cases	Preoperative	30 minutes during surgery	60 minutes during surgery	90 minutes during surgery	Postoperative
Control group	50	36.58 ± 0.22	36.37 ± 0.19	36.25 ± 0.18	36.08 ± 0.22	36.29 ± 0.17
Test team	50	36.51 ± 0.20	36.46 ± 0.22	36.35 ± 0.17	36.20 ± 0.21	36.36 ± 0.19
t value		1.684	2.095	−2.825	−2.932	−2.051
P value		0.095	<0.05	<0.05	<0.05	<0.05

3.3. Surgical Procedure

The experimental group received less volume of colloidal fluid and crystalloid fluid compared to the control group, with a shorter recovery time, showing statistically significant differences ($P < 0.05$), as shown in Table 3.

Table 3. Comparison of surgical conditions between the two groups of patients ($\bar{x} \pm s$).

Group	Number of cases	Colloid solution (ml)	Crystal solution (ml)	Awakening time (h)
Control group	50	664.10 ± 51.15	1612.00 ± 152.72	2.27 ± 0.58
Test team	50	612.70 ± 25.20	1426.00 ± 100.12	1.46 ± 0.33
t value		6.374	7.202	8.494
P value		<0.001	<0.001	<0.001

3.4. Adverse Events

The incidence of intraoperative hypothermia, postoperative agitation, and shivering in the experimental group was significantly lower than that in the control group ($P < 0.05$), as shown in Table 4.

Table 4. Comparison of adverse events between the two groups [*n* (%)].

Group	Number of cases	Intraoperative hypothermia	Agitation during the awakening phase	Shiver
Control group	50	13 (26%)	9 (18%)	11 (22%)
Test team	50	4 (8%)	2 (4%)	3 (6%)
χ^2 value		5.741	5.005	5.316
P value		<0.05	<0.05	<0.05

4. Discussion

Patients undergoing thoracoscopic pneumonectomy are at higher risk of intraoperative hypothermia, which correlates with factors such as anesthesia duration, core temperature at admission, and surgical preparation time [13]. As a vital physiological parameter, body temperature is regulated by the thermoregulatory center and neurohumoral mechanisms to maintain a balance between heat production and dissipation, thereby sustaining a relatively stable internal environ-

ment. Hypothermia can compromise systemic stability, suppress immune function, and increase the risk of postoperative adverse events [14]. Therefore, intraoperative temperature management is of paramount importance.

Currently, clinical thermal preservation measures primarily involve basic interventions such as room temperature regulation, quilt insulation, and fluid warming, which can provide some degree of warmth but still result in a relatively high incidence of hypothermia [15]. The findings of this study indicate that the experimental group exhibited higher intraoperative body temperatures at 30, 60, and 90 minutes, as well as at the end of surgery, compared to the control group. Additionally, the experimental group required less volume of colloidal and crystalloid fluids than the control group, had a shorter recovery time, and demonstrated lower rates of intraoperative hypothermia, postoperative agitation, and chills. These results suggest that the application of moxibustion at specific acupoints can stabilize intraoperative body temperature in patients undergoing thoracoscopic pneumonectomy, reduce the risk of hypothermia, shorten recovery time, and promote patient rehabilitation. The mechanism of action lies in the rational selection of acupoints through syndrome differentiation therapy, which integrates the effects of traditional Chinese medicine with the meridian functions of acupoints, achieving an external treatment effect for internal diseases. During clinical application, moxibustion at specific acupoints can produce multiple effects, including far-infrared radiation from moxa, heat application, moxibustion, and magnetotherapy, effectively dispelling wind-cold, warming the body, relaxing meridians, and promoting blood circulation [16]. Moxibustion at specific acupoints offers sustained effects and stable temperature, continuously stimulating the acupoints to enhance the warming and dispelling of cold effects, accelerate blood circulation, and maintain stable intraoperative and postoperative body temperature, thereby reducing the risk of cold pathogen invasion during surgery [17]. Furthermore, the application of moxibustion at specific acupoints is simple to perform and has fewer side effects, making it suitable for surgical patients.

5. Conclusion

In conclusion, acupoint moxibustion application can reduce intraoperative body temperature fluctuations, shorten postoperative recovery time, and decrease the risk of adverse events such as intraoperative hypothermia in patients undergoing laparoscopic pneumonectomy.

Conflicts of Interest

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

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