

Effect of Intraoperative Temperature Protection Nursing on Postoperative Complications in Cardiac Surgery Patients

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Abstract: *Objective:* To observe the impact of intraoperative body temperature protection nursing on the occurrence of postoperative complications in patients undergoing cardiac surgery. *Methods:* A total of 120 patients who underwent cardiac surgery in our hospital from February 2024 to February 2026 were selected as the research subjects. They were randomly divided into the control group and the observation group using the random number table method. The 60 patients in the control group received routine intraoperative nursing for cardiac surgery, while the 60 patients in the observation group received intraoperative body temperature protection nursing in addition to the routine care. This study compared the differences in core body temperature levels at different time points during the operation, the incidence of postoperative complications, nursing satisfaction, and the changes in various postoperative recovery indicators between the two groups. The effect of intraoperative body temperature protection nursing on the intervention of patients undergoing cardiac surgery was evaluated. *Results:* The core body temperature levels of the observation group at 30 minutes, 60 minutes, and at the end of the operation were all higher than those of the control group ($p < 0.05$), and the incidence of postoperative complications such as arrhythmia, incision infection, and shivering in the observation group was lower than that in the control group ($p < 0.05$). The nursing satisfaction rate of the observation group was higher than that of the control group ($p < 0.05$), and the postoperative awakening time, ICU stay time, and hospital stay time of the observation group were shorter than those of the control group ($p < 0.05$). *Conclusion:* The application of intraoperative body temperature protection nursing can effectively maintain the stability of core body temperature at all time points during cardiac surgery, and can specifically reduce the risk of postoperative complications such as arrhythmia, which is conducive to the postoperative recovery of patients, can improve patients' satisfaction with nursing intervention, and has high clinical application value.

Keywords: Intraoperative body temperature protection nursing; Cardiac surgery; Postoperative complications

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1. Introduction

Clinically, congenital heart diseases such as atrial septal defect, tetralogy of Fallot, ventricular septal defect,

and acquired heart diseases such as coronary heart disease, constrictive pericarditis, and heart valve diseases all fall within the scope of cardiac surgery treatment. Moreover, vascular diseases such as aortic aneurysm and aortic dissection also require cardiac surgery for symptomatic intervention. Clinically, various surgical procedures such as heart valve replacement, bypass surgery, heart transplantation, and mediastinal tumor resection are commonly used for symptomatic intervention for the aforementioned diseases. Based on the individual patient's condition and disease type, a reasonable surgical treatment approach is selected to help patients avoid the harm of the diseases and ensure their physical health and life safety^[1]. However, due to the common characteristics of cardiac surgery, such as large trauma, long operation time, wide exposure of organs, and high rate of extracorporeal circulation usage, the incidence of perioperative hypothermia in patients undergoing cardiac surgery is higher than that of patients undergoing general surgery^[2]. Relevant statistics indicate that patients undergoing cardiac surgery without standardized temperature protection have a risk of intraoperative hypothermia exceeding 60%. For humans, the normal physiological range of core body temperature is 36.0–37.5 °C. However, due to the combined influence of factors such as the low temperature environment in the operating room, extensive skin disinfection and heat dissipation, open thoracic exposure, and extracorporeal circulation blood cooling, the core body temperature of patients undergoing cardiac surgery will rapidly decrease, making intraoperative hypothermia highly likely^[3]. The occurrence of intraoperative hypothermia not only inhibits the body's coagulation function, increases the risk of intraoperative and postoperative bleeding, but also significantly reduces the activity of immune cells, thereby increasing the risk of postoperative infection^[4]. In addition, intraoperative hypothermia can also stimulate the sympathetic nerve, thereby increasing myocardial oxygen consumption, significantly increasing the risk of arrhythmia and other adverse cardiac events, and seriously threatening the patient's life safety^[5]. Therefore, ensuring the intraoperative temperature protection of patients undergoing cardiac surgery is of great significance for the smooth progress of the surgery and the prognosis of postoperative recovery. For this reason, this article specifically observed the impact of intraoperative temperature protection nursing on the occurrence of postoperative complications in patients undergoing cardiac surgery, with the aim of providing certain practical basis for the temperature protection of patients undergoing cardiac surgery, and the content is reported as follows.

2. Materials and methods

2.1. General information

The Medical Ethics Committee of our hospital has approved the conduct of this study. From February 2024 to February 2026, 120 patients who underwent surgical treatment in our hospital's cardiac surgery department were selected as the research subjects. They were divided into the control group and the observation group using the random number table method, with 60 subjects in each group for comparative study. **Table 1** shows that there was no statistically significant difference in gender, age, and primary disease type between the two groups of research subjects ($p > 0.05$), allowing for the comparison of various observation indicators.

Table 1. Comparison of general data among groups

Item	Control group (n = 60 cases)	Observation group (n = 60 cases)	t/χ^2 value	p value
Gender (Male/Female)	33/27	31/29	0.1339	0.7144

Item		Control group (n = 60 cases)	Observation group (n = 60 cases)	t/χ^2 value	p value
Age (years)		53.68 ± 6.42	54.25 ± 6.37	0.4882	0.6263
Operation duration (hours)		4.12 ± 1.05	4.08 ± 1.12	0.2018	0.8404
Operation type	Heart valve replacement surgery	22 (36.67)	21 (35.00)	0.0362	0.8490
	Coronary artery bypass surgery	20 (33.33)	19 (31.67)	0.0380	0.8455
	Congenital heart disease correction surgery	13 (21.67)	14 (23.33)	0.0478	0.8270
	Aortic dissection surgery	5 (8.33)	6 (10.00)	0.1001	0.7517

2.1.1. Inclusion criteria

- (1) Meets the indications for cardiac surgery, and is undergoing the first open-chest heart surgery;
- (2) Age between 30 and 76 years old, with basically stable vital signs before the surgery;
- (3) Preoperative core body temperature is 36.0–37.5 °C, without history of fever or hypothermia-related diseases;
- (4) Normal cognitive function, able to cooperate with perioperative care and postoperative follow-up;
- (5) Complete clinical data, without any withdrawal from the study during the course of the study.

2.1.2. Exclusion criteria

- (1) Patients with severe liver or kidney failure, coagulation disorders, autoimmune diseases, or severe lung diseases are excluded;
- (2) Patients with preoperative arrhythmia, infectious diseases, or abnormal body temperature are excluded;
- (3) Patients with severe sudden adverse events such as massive bleeding or cardiac arrest during the operation are excluded;
- (4) Patients with mental disorders or cognitive impairments who cannot cooperate with nursing interventions are excluded;
- (5) Patients with a history of previous cardiac surgery or those undergoing a second surgery are excluded;
- (6) Patients who transfer to another hospital midway, give up treatment, or have missing clinical data are excluded.

2.2. Methods

2.2.1. Control group (Conventional cardiac surgery intraoperative nursing)

Before the operation, the medical staff conducted routine visits to the patients, provided detailed explanations of the surgical process and relevant precautions to the patients, and patiently answered their questions to enhance the patients' cooperation. During the operation, the medical staff closely monitored the changes in the patients' vital signs such as heart rate, blood pressure, and blood oxygen saturation, and ensured proper intraoperative cooperation to guarantee the smooth progress of the surgery. After the operation, the medical staff completed hemostasis, suturing, anti-infection and other treatments in coordination and sent the patients to the ICU ward for monitoring.

2.2.2. Observation group (Conventional cardiac surgery intraoperative nursing + intraoperative temperature protection nursing)

- (1) When medical staff conduct preoperative visits, they should explain in detail to the patients and their

families the hazards of intraoperative hypothermia and the importance of temperature protection. Moreover, 30 minutes before the operation, medical staff should activate the constant temperature system of the operating room, preheat the operating room temperature to 24–26 °C, and control the humidity to 50–60%, in order to reduce the heat dissipation of the environment. Additionally, medical staff need to preheat the fluids and irrigation solutions to be infused during the operation and maintain a constant temperature of 37 °C. After the patient enters the operating room, medical staff should complete the preoperative preparations quickly, minimize the patient's skin exposure time, and quickly cover the non-operative areas of the patient with sterile protective materials and insulation blankets.

- (2) During the operation, the medical staff should collect the patient's core body temperature data every 15 minutes, closely monitor the changes in the patient's core body temperature, and try to keep the patient's core body temperature within the range of 36.0–37.5 °C. In addition to covering the exposed skin of the patient with the insulation blanket, they should also help the patient wear cotton insulation sleeves at the extremities of the limbs. By reducing heat loss at the periphery, they can maintain the patient's body temperature. For patients undergoing extracorporeal circulation during the operation, they must strictly follow the principle of uniform temperature rise and drop, and control the cooling and rewarming rates within 0.5 °C/min. Finally, during the operation, the medical staff should promptly remove the accumulated fluid and blood in the surgical area, avoid accelerating heat loss with wet dressings, and replace the dry and sterile dressings regularly.
- (3) After the surgery is completed, the medical staff should promptly shut off the ventilation equipment to maintain the stability of the environmental temperature in the operating room and quickly wipe the patient's body surface with blood and disinfectant solution to keep the patient's skin dry. Moreover, the medical staff should immediately cover the patient's entire body with an electric blanket after the surgery to prevent the patient's body temperature from dropping. During the postoperative transfer process, the medical staff also need to use transfer warming beds and insulation quilts for insulation, and try to shorten the transfer time to reduce the influence of the external environment on the patient's body temperature. After the patient is transferred to the ICU, they also need to closely monitor the patient's body temperature changes and adjust the warming plan according to the patient's body temperature to maintain the patient's body temperature within the normal range. And if the patient shows signs of hypothermia such as shivering and cold limbs, timely symptomatic intervention measures should be taken to avoid the occurrence of postoperative hypothermia-related complications.

2.3. Evaluation criteria

- (1) Core body temperature levels at different time points during the operation

Record the core body temperature (nasopharyngeal temperature) of both groups of patients at the time of entering the operating room, 30 minutes after the operation, 60 minutes after the operation, and at the end of the operation. Compare the differences in body temperature at different time points.

- (2) Postoperative complication rate

Count the occurrence of complications within 7 days after the operation for both groups of patients, including arrhythmia, incision infection, postoperative hypothermia, chills, thoracic bleeding, and pulmonary infection. Calculate the total complication rate.

- (3) Nursing satisfaction

Use the self-developed perioperative nursing satisfaction scale of our hospital. Conduct a survey before the patients are discharged. The scale has a full score of 100 points. 90–100 points are considered very satisfied, 70–89 points are considered satisfied, and less than 70 points are considered unsatisfied. The total satisfaction rate = (number of very satisfied cases + number of satisfied cases) / total number of cases × 100%.

(4) Postoperative recovery indicators

Record the recovery time after the operation, ICU stay time, and total hospital stay time for both groups of patients. Compare the rehabilitation efficiency of the two groups.

2.4. Statistical methods

The data from this study were analyzed and processed using SPSS 26.0 statistical software. Measurement data (body temperature, recovery time, etc.) were expressed as mean ± standard deviation ($\bar{x} \pm s$), and comparisons between groups were conducted using *t*-tests; count data (complication incidence rate, satisfaction rate) were expressed as rates (%), and comparisons between groups were performed using χ^2 tests; a *p* value < 0.05 indicated statistically significant differences.

3. Results

3.1. Comparison of core body temperature levels at different time points during the operation between the two groups

Table 2 shows that the core body temperature levels of the patients in the observation group at 30 minutes, 60 minutes after the start of the operation, and at the end of the operation were all higher than those of the control group (*p* < 0.05).

Table 2. Comparison of core body temperature levels at different time points during surgery between the two groups ($\bar{x} \pm s$)

Group/Category	Number of examples	When entering the room	Surgery: 30 minutes	Surgery: 60 minutes	At the conclusion of the procedure
Observation group	60	36.82 ± 0.35	36.45 ± 0.36	36.22 ± 0.39	36.51 ± 0.35
Control group	60	36.79 ± 0.38	35.76 ± 0.42	35.41 ± 0.45	35.63 ± 0.41
<i>t</i>	-	0.4498	9.6619	10.5364	12.6448
<i>p</i>	-	0.6537	0.0000	0.0000	0.0000

3.2. Comparison of postoperative complication rates between the two groups

Table 3 shows that the rates of postoperative complications such as arrhythmia, incision infection and chills in the observation group were all lower than those in the control group (*p* < 0.05)

Table 3. Comparison of postoperative complication rates between the two groups [n (%)]

Group/Category	Number of examples	arrhythmia	Incision infection	Postoperative hypothermia	shiver	Thoracic hemorrhage	Lung infection	Postoperative complication rate
Observation group	60	1 (1.67)	0 (0.00)	1 (1.67)	2 (3.33)	0 (0.00)	1 (1.67)	5 (8.33)
Control group	60	4 (6.67)	3 (5.00)	5 (8.33)	6 (10.00)	2 (3.33)	2 (3.33)	16 (26.67)

χ^2	-	-	-	-	-	-	-	6.9841
p	-	-	-	-	-	-	-	0.0082

3.3. Comparison of nursing satisfaction between the two groups

Table 4 shows that the nursing satisfaction rate of the patients in the observation group was higher than that of the control group ($p < 0.05$).

Table 4. Comparison of nursing satisfaction between two groups [n (%)]

Group/Category	Number of examples	Very satisfied	Satisfied	Dissatisfied	Satisfaction rate
Observation group	60	42 (70.00)	16 (26.67)	2 (3.33)	58 (96.67)
Control group	60	28 (46.67)	22 (36.67)	10 (16.67)	50 (83.33)
χ^2	-	-	-	-	5.9259
p	-	-	-	-	0.0149

3.4. Comparison of postoperative recovery indicators between the two groups

Table 5 shows that the postoperative awakening time, ICU stay time, and hospital stay time of the observation group were all shorter than those of the control group ($p < 0.05$).

Table 5. Comparison of postoperative recovery indicators between the two groups ($\bar{x} \pm s$)

Group/Category	Number of examples	Postoperative awakening time (hours)	Length of stay in ICU (days)	Total hospitalization duration (days)
Observation group	60	3.25 ± 0.96	2.05 ± 0.62	9.18 ± 1.86
Control group	60	5.86 ± 1.23	3.12 ± 0.85	12.36 ± 2.15
t	-	12.9572	7.8778	8.6644
p	-	0.0000	0.0000	0.0000

4. Discussion

The results of this study show that the core body temperature levels of patients in the observation group at 30 minutes, 60 minutes after the start of the surgery, and at the end of the surgery were all higher than those of the control group ($p < 0.05$), and the incidence of postoperative complications such as arrhythmia, incision infection, and chills in the observation group was lower than that in the control group ($p < 0.05$). The nursing satisfaction rate of patients in the observation group was higher than that of the control group ($p < 0.05$), and the postoperative awakening time, ICU stay time, and hospital stay time of the observation group were shorter than those of the control group ($p < 0.05$). The above research results prove that intraoperative temperature protection nursing plays a superior role in maintaining the intraoperative body temperature level of patients undergoing cardiac surgery and reducing postoperative complications. Through analysis, it is found that intraoperative temperature protection nursing runs through the entire process of patients undergoing cardiac surgery, from preoperative, intraoperative to postoperative. It can reduce the heat loss of patients from the source through preheating of the operating room environment, preheating of fluids during infusion, and reduction of skin exposure, thereby laying a foundation for intraoperative body temperature protection of

patients; while the intervention measures such as continuous monitoring of core body temperature during the operation, insulation of extremities, and uniform cooling of extracorporeal circulation can comprehensively block the heat dissipation pathways of patients, thereby maintaining the stability of the patient's core body temperature during the operation; measures such as maintaining postoperative environmental temperature, covering with insulation blankets, shortening the transfer time, monitoring of body temperature in the ICU, and symptomatic adjustment can effectively avoid the occurrence of postoperative hypothermia and related complications, thereby promoting the postoperative recovery of patients^[6].

5. Conclusion

In conclusion, the application of intraoperative body temperature protection nursing can effectively maintain the core body temperature stability of patients undergoing cardiac surgery at all time points during the operation, and can specifically reduce the risk of postoperative complications such as arrhythmia, which is conducive to the postoperative recovery of patients and can enhance patients' satisfaction with the nursing intervention. Therefore, its clinical application value is relatively high.

Disclosure statement

The authors declare no conflict of interest.

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