

Analysis of the Application Effect of Comprehensive Intraoperative Warming Care in Patients Undergoing Cholecystectomy Surgery

Song Wang

Xuzhou Central Hospital, Xuzhou 221000, Jiangsu, China

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Abstract: *Objective:* To observe the application effect of comprehensive intraoperative warming care in patients undergoing cholecystectomy. *Methods:* 76 patients undergoing cholecystectomy in our hospital (from August 2024 to November 2025) were selected and randomly divided into an observation group (38 cases) receiving comprehensive intraoperative warming care and a control group (38 cases) receiving routine care. The patients' temperature changes, incidence of hypothermia, hemodynamics, coagulation function, and incidence of complications were observed. *Results:* Compared with the control group, the observation group had higher body temperature at 15 minutes during surgery and immediately after surgery, a lower incidence of hypothermia, smaller changes in hemodynamic indicators at 15 minutes during surgery and immediately after surgery, better coagulation function indicators after nursing, and a lower incidence of complications, $p < 0.05$. *Conclusion:* The application of intraoperative comprehensive thermal insulation care in patients undergoing cholecystectomy can maintain the patient's body temperature, reduce the incidence of hypothermia, reduce the impact on hemodynamics and coagulation indicators, and reduce the incidence of complications, which is worth learning from.

Keywords: Intraoperative comprehensive warming care; Cholecystectomy; Surgery

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1. Introduction

Cholecystectomy is an effective surgical treatment that plays an important role in the treatment of patients' diseases. However, during the treatment process, relevant intraoperative operations will have a greater impact on the patient's physiological state. The use of anesthetic drugs during the operation will also inhibit the patient's body temperature regulation center, leading to temperature regulation dysfunction. In addition, a large area of the patient's abdominal skin will be exposed during the operation, and related low-temperature irrigation fluids will also be used. Under the influence of the above factors, the patient's core temperature will be reduced, which can easily lead to intraoperative hypothermia^[1]. For patients, if effective intervention is not carried out in time after hypothermia occurs, it will lead to abnormal coagulation function, increase the risk of intraoperative bleeding, and may also cause complications such as infection, which will affect the smooth operation of the operation and is not conducive to the patient's early postoperative recovery, further affecting the prognosis^[2]. Therefore, during surgical treatment, hypothermia is a factor that has a great impact on the quality of surgery and patient prognosis.

During the treatment of cholecystectomy patients, it is necessary to pay attention to intraoperative insulation care and take effective measures to prevent and correct hypothermia, so that patients can maintain stable physiological functions during surgery, ensure smooth operation, reduce the risk of complications, and obtain better recovery effects^[3]. Comprehensive thermal insulation care during surgery has attracted attention, and the effect of its implementation can be further explored.

2. Materials and methods

2.1. General information

A total of 76 patients undergoing cholecystectomy in our hospital from August 2024 to November 2025 were selected and randomly divided into 2 groups. There were 38 patients in the control group, 20 males and 18 females, aged 25 to 73 (49.73 ± 3.27) years old, and 38 patients in the observation group, 21 males and 17 females, aged 24 to 72 (49.66 ± 3.52) years old. Comparison of general data, $p > 0.05$.

2.1.1. Inclusion criteria

Meet the surgical indications for cholecystectomy; be able to tolerate general anesthesia and surgery; and have no coagulation dysfunction.

2.1.2. Exclusion criteria

Combined with basic diseases such as severe hypertension; presence of other infectious lesions; mental abnormality; missing medical records.

2.2. Method

2.2.1. Control group

Adjust the indoor temperature before surgery to maintain 22°C to 25°C and humidity between 30% and 60%. Provide good nursing cooperation during the operation and observe changes in vital signs.

2.2.2. Observation group

- (1) Specialized personnel will closely monitor the operating room environment and accurately control the indoor temperature to maintain 22°C to 25°C and a stable air humidity of 30% to 60%. When the outside temperature is low, the indoor temperature can be appropriately raised to maintain 26°C to 28°C. Through the above methods, the ambient temperature and humidity can be ensured to be in a constant state.
- (2) Preheating preparation is required 30 minutes before the operation. A heating blanket can be placed on the operating bed. It needs to be preheated to 22°C to 25°C, and then maintained at a constant temperature. After the patient is on the operating bed, the heating level can be adjusted appropriately.
- (3) In the process of disinfecting the skin of the patient's surgical area, it is necessary to use sterile gauze to complete various operating procedures quickly and standardizedly. Each operation should be carried out as compactly as possible, and the nursing staff should maintain skilled movements to shorten the disinfection time as much as possible, thereby reducing the exposure time of the skin in the abdominal surgical area. A sterile drape must be laid immediately after the disinfection operation is completed to avoid continued dissipation of heat from the patient's skin.
- (4) Patients need to use a variety of liquids during the operation, such as infusion, peritoneal flushing, intravenous rehydration, etc. During the above operations, all liquids need to be heated in advance. They can be placed in a medical constant-temperature incubator and preheated to 37°C before use. During this process, in order to maintain the temperature of the liquid in the pipeline, a liquid heater needs to be used to maintain the temperature and prevent low-temperature liquid from entering the human body and lowering the core body temperature.

- (5) Before surgery, the surgical plan is individually formulated based on the specific type of gallbladder lesions and physical condition of the patient, and items required during the surgery are prepared in advance, such as instruments, first aid supplies, etc., so that the surgical cooperation process can be optimized and the efficiency of the surgery can be improved. When performing intraoperative operations, medical staff must cooperate closely to minimize redundant operations, improve surgical accuracy, prevent emergencies from affecting the surgical process, reduce operating time as much as possible, and further shorten the exposure time of the patient's skin and abdominal organs.
- (6) During the surgical treatment, except for the surgical area that must be exposed during the surgery, the remaining parts need to be covered with quilts, such as the limbs, shoulders, and neck. During non-operation periods, exposed skin must be covered in time.

2.3. Observation indicators

- (1) Changes in body temperature;
- (2) Incidence of hypothermia;
- (3) Hemodynamics;
- (4) Coagulation function;
- (5) Incidence of complications.

2.4. Statistical methods

SPSS26.0 software; measurement data and counting data are represented by ($\bar{x} \pm s$), n, % respectively. Carry out a *t* and χ^2 test; $p < 0.05$, the difference is statistically significant.

3. Results

3.1. Comparison of body temperature changes

The observation group was higher than the control group at 15 minutes during operation and immediately after operation, $p < 0.05$, **Table 1**.

Table 1. Comparison of body temperature changes ($\bar{x} \pm s$, °C)

Group	Before surgery	15 minutes during operation	Immediately after surgery
Control group (n = 38)	36.68 ± 0.22	35.78 ± 0.21	36.10 ± 0.18
Observation group (n = 38)	36.66 ± 0.20	36.47 ± 0.34	36.72 ± 0.17
<i>t</i>	0.415	1.644	15.437
<i>p</i>	0.680	0.000	0.000

3.2. Comparison of the incidence of hypothermia

The incidence of hypothermia in the observation group was lower than in the control group, $p < 0.05$, **Table 2**.

Table 2. Comparison of hypothermia incidence rates

Group	Occur (n)	Incidence rate (%)
Control group (n = 38)	4	10.53
Observation group (n = 38)	0	0.00
χ^2	-	4.222
<i>p</i>	-	0.040

3.3. Hemodynamic comparison

At 15 minutes and immediately after surgery, the observation group was better than the control group, $p < 0.05$, **Table 3**.

Table 3. Hemodynamic comparison ($\bar{x} \pm s$)

Group	HR (times/min)			MAP (mmHg)		
	Before surgery	15 minutes during operation	Immediately after surgery	Before surgery	15 minutes during operation	Immediately after surgery
Control group (n = 38)	86.23 $\pm$ 4.37	73.84 $\pm$ 4.57	74.85 $\pm$ 5.47	95.82 $\pm$ 2.75	84.73 $\pm$ 2.56	90.72 $\pm$ 3.47
Observation group (n = 38)	86.58 $\pm$ 4.11	76.48 $\pm$ 5.64	77.55 $\pm$ 5.32	95.68 $\pm$ 2.67	88.79 $\pm$ 2.67	93.68 $\pm$ 3.32
<i>t</i>	0.360	2.242	2.181	0.579	6.766	3.799
<i>p</i>	0.720	0.028	0.032	0.564	0.000	0.000

3.4. Comparison of coagulation function

After nursing, the observation group was lower than the control group, $p < 0.05$ **Table 4**.

Table 4. Comparison of coagulation function ($\bar{x} \pm s$)

Group	TT (s)		PT (s)		FIB (g/L)		APTT (s)	
	Before care	After care	Before care	After care	Before care	After care	Before care	After care
Control group (n = 38)	11.54 $\pm$ 1.67	18.37 $\pm$ 2.43	11.85 $\pm$ 1.66	16.38 $\pm$ 1.40	2.20 $\pm$ 0.55	2.78 $\pm$ 0.87	36.40 $\pm$ 1.30	42.38 $\pm$ 2.37
Observation group (n = 38)	11.57 $\pm$ 1.56	13.65 $\pm$ 1.84	11.69 $\pm$ 1.58	14.47 $\pm$ 1.55	2.23 $\pm$ 0.58	2.20 $\pm$ 0.48	36.43 $\pm$ 1.34	37.46 $\pm$ 1.20
<i>t</i>	0.081	9.546	0.430	5.637	0.231	3.598	0.099	11.417
<i>p</i>	0.936	0.000	0.668	0.000	0.818	0.001	0.921	0.000

3.5. Comparison of complication rates

The observation group was lower than the control group, $p < 0.05$ **Table 5**.

Table 5. Comparison of complication rates [(n)%]

Group	Chills	Arrhythmia	Restless	Complications occur
Control group (n = 38)	2 (5.26)	2 (5.26)	3 (7.89)	7 (18.42)
Observation group (n = 38)	0 (0.00)	0 (0.00)	1 (2.63)	1 (2.63)
χ^2	-	-	-	5.029
<i>p</i>	-	-	-	0.025

4. Discussion

In hepatobiliary surgery, cholecystectomy is a commonly used surgical method. At this stage, due to the development of medical technology, laparoscopic minimally invasive technology has been widely used and has become the main surgical method. During the specific treatment period, artificial pneumoperitoneum needs to be established, the surgical field of view needs to be exposed, and the surgical operation needs to be completed through anesthesia^[4]. When the patient is under anesthesia, their ability to regulate body temperature autonomously will be further reduced, and due to factors such as prolonged exposure of the skin in the surgical area and large amounts of fluid input, the patient's core body temperature

will decrease ^[5]. Abnormal body temperature will directly interfere with the body's normal metabolism and physiological functions, affect the safety of surgical operations, lead to increased postoperative discomfort for patients, and increase the risk of complications. Therefore, effective nursing measures must be taken to maintain intraoperative body temperature stability ^[6]. Intraoperative comprehensive body temperature care is a systematic body temperature protection care model, which is mainly carried out for surgical patients and has full-process characteristics. The main goal of this nursing model is to maintain the stability of the patient's core body temperature. During the implementation process, a number of measures can be used to establish a body temperature protection system at different levels to reduce body heat loss, prevent patients from being stimulated by hypothermia, maintain good vital signs, and ensure the stability of the internal environment ^[7].

In the results of this study, the body temperature of the observation group for 15 minutes during the operation and immediately after the operation was higher than that of the control group ($p < 0.05$). The reason is that the temperature and humidity of the operating room environment can be accurately adjusted and maintained at a constant state during the comprehensive intraoperative thermal insulation care process. At the same time, it is effectively combined with thermal insulation measures such as pre-warming the operating bed and timely covering of non-operative areas, which is beneficial to reducing patient heat loss. Rapid and standardized disinfection during the nursing period and optimization of the surgical operation process will help further reduce the exposure time of the skin in the surgical area, thereby preventing continued heat loss. The above measures maintain the stability of the patient's core body temperature from different aspects, thereby maintaining a good body temperature during the operation and immediately after the operation ^[8]. The incidence of hypothermia in the observation group was lower than that in the control group ($p < 0.05$). During the comprehensive thermal insulation care during the operation, the liquid used is heated in advance to make it close to the normal temperature of the human body. At the same time, the pipeline heating device is used for continuous insulation. Through the above aspects, it can fundamentally prevent low-temperature liquid from entering the body and causing the body temperature to drop. Closely monitoring body temperature during the entire operation and taking active measures to keep warm can avoid the triggers of hypothermia and thus reduce the incidence of hypothermia. The changes in intraoperative and postoperative hemodynamic indicators in the observation group were smaller than those in the control group ($p < 0.05$). Under comprehensive intraoperative warming care, patients can maintain a stable core body temperature, thereby preventing abnormal vascular contraction and stress response due to low temperature, and maintaining stable hemodynamics. When the patient's body temperature is stable, it is conducive to maintaining normal vasomotor function, further reducing fluctuations in blood pressure, heart rate, etc., ensuring that hemodynamic indicators are in a relatively stable state, and also ensuring the safety of surgical treatment to a large extent ^[9]. The coagulation function index of the observation group after nursing was better than that of the control group ($p < 0.05$). During the comprehensive intraoperative heat preservation care, the patient maintains normal body temperature, which is conducive to maintaining coagulation factor activity and normal platelet function, preventing low temperature from inhibiting the coagulation mechanism, and avoiding further prolongation of coagulation time. By ensuring a stable internal environment and body temperature, the coagulation function is always maintained in a stable state, reducing the risk of intraoperative bleeding, and laying a good foundation for the patient's effective postoperative recovery. The incidence of complications in the observation group was lower than that in the control group ($p < 0.05$). The implementation of comprehensive thermal insulation care during surgery can maintain a stable body temperature and avoid various adverse events caused by hypothermia, such as chills and restlessness. It is also conducive to reducing stress damage to the body and improving the patient's tolerance for surgery. In the process of good body temperature management of patients, it is also helpful to reduce the risk of postoperative infection and create good conditions for their postoperative physical recovery ^[10].

Therefore, the application of comprehensive intraoperative warming care in patients undergoing cholecystectomy can maintain the patient's body temperature, reduce the incidence of hypothermia, reduce the impact on hemodynamics and coagulation indicators, and reduce the occurrence of complications, and has promotion value.

About the author

Wang Song (1990—), female, Han, Xuzhou, Jiangsu, undergraduate, research direction is nursing.

Disclosure statement

The author declares no conflict of interest.

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