

## Original Article

# Effect of comprehensive care intervention on prevention of postoperative accompanying infection of kidney stonesurgery

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**Abstract:** Objective: To investigate the effect of comprehensive care intervention on the prevention of postoperative accompanying infection of kidney stonesurgery. Methods: Four hundred and seventy-six kidney stone patients treated with urologic surgical procedures in our hospital from January to December 2016 were selected as the subjects. They were randomly divided into the intervention group and control group, with 238 cases in each group. The control group received routine nursing care, while the intervention group received routine nursing care and comprehensive care intervention, including psychological care, health education, pain nursing, drainage tube nursing, infection prevention and control measures, etc. Then, the changes in patients' body temperatures were observed, the incidence of postoperative infection was compared, the surgical wound healing was observed and the postoperative hospital stays were compared between the two groups. Results: After comprehensive care intervention, the number of the patients whose body temperatures were more than 39°C in the intervention group (6 cases) was significantly less than that in the control group (27 cases,  $P < 0.001$ ). The postoperative infection rate in the intervention group (2.1%) was significantly lower than that in the control group (8.8%,  $P = 0.001$ ). The surgical wound healing in the intervention group was better than that in the control group ( $P = 0.017$ ). The postoperative hospital stays in the intervention group ( $8.8 \pm 2.0$  days) were significantly shorter than those in the control group ( $11.2 \pm 1.8$  days,  $P < 0.001$ ). Conclusion: Comprehensive care intervention can effectively prevent the incidence of postoperative infection of kidney stone surgery, promote surgical wound healing and shorten the length of hospital stays. Therefore, it is worthy of promotion and clinical application.

**Keywords:** Kidney stone, minimally invasive treatment, hospital infection, comprehensive care intervention

## Introduction

Kidney stone is a common urinary system disease, which occurs frequently in males; patients often accompanied by renal colic, chills and fever, hematuria, abdominal distension, vomiting, unbearable lumbar acid, dull pain in the body, paroxysmal pain and other clinical symptoms; the pain degree is related to the stone's location, size, activity, and whether there is any damage, infection or obstruction [1-6]. With the continuous development and maturity of endoscopic technology, minimally invasive treatment for kidney stones, as an important treatment, can effectively take out the stones, and has few complications such as hemorrhage [1, 2, 7-9]. But minimally invasive surgery is not equal to non-invasive surgery,

because of the impact of disease and surgical trauma, postoperative complications like infection are easy to occur [10-13]. As a common complication of minimally invasive treatment for kidney stones, if not promptly treated, postoperative infection will develop into infectious shock; on the one hand, urethral obstruction and infection caused by kidney stones are the major risk factors of postoperative infection complications; on the other hand, there are a large number of bacteria in renal struvite stones, which will induce severe infection under the action of surgical stress, seriously affect the effect of surgical treatment and recovery of the patients [13]. Therefore, how to prevent and control postoperative infection in the treatment of kidney stones has become the top priority of clinical care.

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Comprehensive care intervention puts the patients as the center, and provides a series of scientific and reasonable nursing measures for patients on the basis of evidence-based nursing, mainly covering sufficient preoperative preparation, modified skin preparation improvement, psychological care, health education, disease observation, pain nursing, drainage tube nursing, infection prevention and control measures, etc. Comprehensive care intervention provides high quality nursing and controls hospital infection from every detail and every aspect including environment, medical staff, patient and so forth, so it can effectively prevent hospital infection [14, 15]. However, the conventional nursing care, preoperative and postoperative care are performed under the limitation of traditional nursing, it is no wonder the nursing effect has some shortcomings. To this end, this study adopted comprehensive care intervention for patients with kidney stone surgery, to prevent and control the postoperative infection, which achieved good results. It is hereby reported as follows.

### Materials and methods

#### *Case selection and grouping*

This study was approved by the local Ethics Committee. Four hundred and seventy-six patients with kidney stone who received surgical treatment in the Department of Urology in our hospital from January to December 2016 were selected as the subjects. They were randomly divided into the intervention group and control group, with 238 cases in each group.

**Inclusion criteria:** Patients aged more than 18 years, had received kidney stonesurgery for the first time, fully understood the surgical situation and signed informed consent.

**Exclusion criteria:** Patients who suffered from combined hematopoietic system diseases, serious primary diseases in liver and kidney, as well as mentally ill; patients who had urinary stricture, obstruction, etc.; patients who suffered from basic metabolic diseases such as severe hyperglycemia, hyperlipidemia and hypertension; patients who didn't agree to participate in; patients who suffered from kidney stones associated with infection.

#### *Methods*

**Control group:** The control group received routine care, covering necessary preoperative care

and strengthened postoperative care [16]. Briefly, patients were forbidden to drink or eat before surgery. Their vital signs were monitored after they entered the operation room. Also, they were indwelled urinary catheters under general anesthesia. Nurses in the operation room cooperated with surgeons carefully. After operation, a double J tube was routinely retained, the operating field was washed, and then the incision drainage tube was retained. The anti-infective measures for patients included applying antibiotics for 30 minutes before operation, using antibiotics within 24 hours after operation, and removing catheter as soon as the patients' condition improved.

**Intervention group:** The intervention group received comprehensive care intervention on the basis of the traditional nursing care in control group. Specific measures were as follows. Psychological care was strengthened and the psychological state of patients was improved through active propaganda and education, communications, psychological guidance and counseling. [1, 17-19]; positive health education was provided and patients were promoted to cooperate with the medical staffs, and guided to practice defecation and body position by explaining surgical knowledge [1, 2, 17, 20]; preoperative care, ward disinfection management and infection control were strengthened, auxiliary examination was improved, so there were no infected or high-risk infectious patients [3, 12, 21-23]; postoperative care was improved, including positive disease observation, drainage tube and catheter nursing, pain and infection control, diet care, etc. [1, 5, 6, 13, 18-27].

#### *Nursing intervention for postoperative infection or high fever patients*

After the kidney stone surgery, the changes of patients' condition were closely observed by the primary nurse; when patient's body temperature was above 39°C, they needed to be performed physical cooling immediately, or gave medication when necessary. At the same time, auxiliary examinations such as blood routine examination, urine routine examination and urine culture were carried out; once patients were diagnosed as infection, sensitive antibiotics were used rationally according to the results of drug sensitive test [1, 23, 27]. Additionally, the changes of patients' blood pressure and pulse were carefully observed by nurses; if patients were found some infectious shock per-

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**Table 1.** Comparison of general data between the two groups (case,  $\bar{x} \pm s$ )

Group	Case	Gender		Age (years old)	Stones	
		Male	Female		Single	Multiple
Intervention group	238	132	106	33.6 $\pm$ 9.0	101	137
Control group	238	147	91	34.5 $\pm$ 8.7	95	143
T or $\chi^2$		1.949		0.729	0.312	
P value		0.163		0.467	0.576	

**Table 2.** Comparison of the incidence of high fever between the two groups (n, %)

Group	Case	Cases of high fever	High fever rate (%)
Intervention group	238	6	2.5
Control group	238	27	11.3
$\chi^2$			14.359
P value			0.000

formance such as decreased blood pressure, accelerated pulse and acrocyanosis, nurses should notify the physician immediately and cooperate with the rescue [19].

### Follow-up

The changes of patients' body temperature during the postoperative hospital stays were observed and recorded at least twice a day; patients' postoperative infection, surgical wound healing condition and the length of hospital stays were also observed. The diagnostic criteria of surgical site infection were based on the *Diagnostic criteria for nosocomial infection (proposed)* issued by the Ministry of Health [28]. The surgical wound healing condition is divided into three grades: Grade A, B and C. Grade A refers to good initial healing without adverse reactions; Grade B indicates poor healing, that is to say, there are some defects in the surgical wound but without suppuration, suture infection (suppuration in needle holes), red and swollen, excessive induration, hematoma, empyema, cutaneous necrosis, fat liquefaction, incision rupture, etc. Grade C refers to the surgical wound suppuration and open wounds, incision and drainage need performing because of suppuration [28].

### Outcome measures

Main outcome measures were the incidence of postoperative infection and the number and incidence of patients with high fever (body temperature  $>39^\circ\text{C}$ ). Secondary outcome mea-

asures were surgical wound healing condition and postoperative hospital stays.

### Statistical processing methods

SPSS17.0 statistical software was used for data analysis. The measurement data was expressed as the mean  $\pm$  standard deviation ( $\bar{x} \pm s$ ), and pairwise comparison was performed by the independent-samples t test. Chi-square test was adopted for numeration data.  $P < 0.05$  meant the difference was statistically significant.

## Results

### Basic data in two groups

A total of 476 patients who received kidney stone surgery were enrolled, including 279 males and 197 females, aged from 18 to 50 years, with an average of (34.0 $\pm$ 8.9) years. There were 196 patients with single kidney stones and 280 patients with multiple kidney stones. There was no significant difference in gender, age, single or multiple kidney stones and other basic data between the two groups (all  $P > 0.05$ ), as shown in **Table 1**.

### Comparison of body temperature between the two groups

After comprehensive care intervention, the number of patients with high fever in the intervention group (2.5%) was significantly less than that in the control group (11.3%). The difference was statistically significant ( $P < 0.05$ ), as shown in **Table 2**.

### Comparison of postoperative infection between the two groups

After comprehensive care intervention, the postoperative infection rate in the intervention group (2.1%) was significantly lower than that in the control group (8.8%). The difference reached statistical significance ( $P < 0.05$ ), as shown in **Table 3**.

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**Table 3.** Comparison of postoperative infection between the two groups (n, %)

Group	Case	Infection case (case)	Infection rate (%)
Intervention group	238	5	2.1
Control group	238	21	8.8
$\chi^2$ value		10.415	
P value		0.001	

**Table 4.** Comparison of the wound healing condition between the two groups (n, %)

Group	Case	Wound healing grade		
		Grade A	Grade B	Grade C
Intervention group	238	226 (95.0)	12 (5.0)	0 (0)
Control group	238	210 (88.2)	25 (10.5)	3 (1.3)
T value			8.155	
P value			0.017	

**Table 5.** Comparison of postoperative hospital stays between the two groups (case,  $\bar{x} \pm s$ )

Group	Case	Postoperative hospital stays (d)
Intervention group	238	8.8 $\pm$ 2.0
Control group	238	11.2 $\pm$ 1.8
T value		9.702
P value		0.000

### *Comparison of surgical wound healing condition between the two groups*

After comprehensive care intervention, the surgical wound healing condition in the intervention group was better than that in the control group. There was statistically significant difference ( $P < 0.05$ ). See **Table 4**.

### *Comparison of postoperative hospital stays between the two groups*

After comprehensive care intervention, the postoperative hospital stays in the intervention group (8.8 $\pm$ 2.0 days) were significantly shorter than those in the control group (11.2 $\pm$ 1.8 days). And the difference was statistically significant ( $P < 0.05$ ). See **Table 5**.

## Discussion

With high incidence, kidney stone is a common disease of the urinary system, and patients suffer from renal colic; it brings great pain to the patients, if without timely treatment, it will even lead to hydronephrosis and renal failure, then

endangering the patients' life and health [26-29]. Surgical removal of stones is an effective treatment for kidney stones; with the continuous development of endoscopic surgery, higher success rate of minimally invasive surgery to remove stones can be achieved; the surgery also has the advantages of small trauma, quick recovery and less adverse reactions; therefore, it has been widely used in clinic [1, 2, 7-10, 30]. However, patients have many negative emotions such as fear and anxiety before kidney stone surgery; the operation time is prolonged and preoperative infection control is not ideal due to inadequate preoperative preparation; additionally, poor postoperative care and unsmooth drainage tubes will easily lead to infection and other complications [10, 31, 32]; the mentioned respects will affect the operation results, prolong the hospital stays, increase the patients' pain and the hospitalization expenses. Therefore, it has become an important nursing measure to

provide comprehensive care intervention for patients with kidney stones, reduce complications like infection, and strengthen the surgical effects.

This study proposed that after comprehensive care intervention, the number of patients with high fever in the intervention group (6 cases) was significantly less than that in the control group (27 cases); the postoperative infection rate in the intervention group (2.1%) was significantly lower than that in the control group (8.8%). These showed that comprehensive care intervention could effectively prevent and control postoperative infection of kidney stones. This was because in this study, patients' psychological care was strengthened, and effective health education was carried out to make patients cooperate well with the medical staffs; the primary nurses were ready for full preoperative preparation to ensure the smooth operation, shorten the operation time and reduce the infection; after operation, they closely observed patients' condition, timely found out the changes of their condition, intervened in

time, strengthened the drainage tube nursing, and promoted the operative rehabilitation; comprehensive nursing measures mentioned above could effectively prevent the infection. It was reported that postoperative nurse intervention could effectively control patients' body temperature, and reduce the incidence of infection [33]. A study demonstrated that providing preoperative examination for patients with kidney stone surgery, strengthening the double J tube and catheter nursing, as well as urging patients to have a good rest, drink plenty of water and maintain 2,000 ml of daily urine volume could effectively reduce the incidence of infection, which was consistent with the results in this study [34]. Another study described that comprehensive care could reduce the rate of postoperative infection in patients undergoing hepatobiliary surgery, and had remarkable nursing effects, which was similar to the effects in this study [14].

In this study, after comprehensive care intervention, the surgical wound healing in the intervention group was better than that in the control group. Thus, comprehensive nursing intervention could promote the surgical wound healing. In this study, a series of nursing interventions were adopted, which effectively controlled the infection and there by promoted the surgical wound healing. The drainage tube nursing promoted effective drainage, and the pain nursing intervention reduced the patients' pain to make patients better cooperate with postoperative rehabilitation measures, which was advantageous to the postoperative recovery and promoted the surgical wound healing [6]. To prevent postoperative infection, nursing measures like strengthening postoperative nursing, preventing postoperative infection and promoting surgical wound healing were important [19]. A research proved that comprehensive care intervention could significantly reduce the surgical wound infection rate in operating room, promote wound healing and postoperative rehabilitation, which was in line with the application effects of kidney stone surgery in this study [15].

This study showed that after comprehensive care intervention, the postoperative hospital stays in the intervention group ( $8.8 \pm 2.0$  days) were obviously shorter than those in the control group ( $11.2 \pm 1.8$  days), indicating that comprehensive care intervention could shorten hospital stays of patients undergoing kidney

stone surgery. The possible reasons were that full preoperative preparation made patients in the best condition to receive surgery; nurses adequately prepared the items to ensure smooth operation; meticulous psychological care, and effective health guidance let the patients cooperate with medical staffs better; the primary nurses closely observed the changes of the patients' condition, strengthened the drainage tube nursing, prevented the complications, and treated complications once they appeared; these measures together ensured the success of kidney stone surgery and promoted patient recovery, which was similar to the findings of previous findings [1, 35]. It was said that providing positive psychological care, eliminating patients' concerns, helping patients establish the confidence for surgery, closely observing the condition after operation, giving symptomatic nursing, and strengthening the drainage tube nursing could effectively reduce the incidence of infection, shorten the hospital stays, as well as promote the patient recovery early [23].

This study is a single center study, and there are some limitations in sample selection. Therefore, in the future research, multi-center researches need to be carried out with more representative samples.

In short, the comprehensive care intervention through strengthening psychological care, health education, and making full preoperative preparation and high-quality postoperative care can effectively prevent and control infection in patients with kidney stones after surgery. It is worthy of clinical application.

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### Disclosure of conflict of interest

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