Original Article
The clinical effect of nursing intervention in the operating room on the prevention of orthopedic wound infections

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Abstract: Objective: To study the preventive effect of operating room nursing intervention on surgical incision infections in elderly patients undergoing orthopedic surgery. Methods: Altogether, 128 orthopedic patients were divided into an observation group and a control group according to the nursing method each patient underwent, with 64 patients in each group. Results: The grade A incision healing rate in the observation group was significantly higher than the rate in the control group (P<0.01). The eating and getting out of bed times, and the lengths of the hospital stays in the observation group were significantly shorter than the corresponding times in the control group (P<0.01). The incidences of postoperative wound infections in the observation group (0 cases) was significantly lower than the incidences in the control group (14 cases, accounting for 21.88%), and the difference was statistically significant (P<0.001). After the nursing, the prognoses and quality of life scores of the patients in the observation group were better than they were in the control group, and the differences were statistically significant (P<0.01). Our investigation indicated that, after the treatment, the overall patient satisfaction rate in the observation group (98.44%) was significantly higher than the patient satisfaction rate in the control group (84.38%), and the difference was statistically significant (χ^2=27.349, P=0.000). Conclusion: Operating room nursing intervention can effectively prevent postoperative wound infections and promote incision healing, so it is worthy of application.

Keywords: Operating room nursing, orthopedics, wound infections, clinical effect

Introduction

In recent years, the orthopedics incidence rate has increased by 3% every year [1, 2]. In the current hospital clinical treatment process, orthopedics includes a variety of disease types, and the surgical choices are also more complex. Wound infection is very common in surgery, and measures to prevent orthopedic wound infections have been explored in China [3, 4]. There are many factors leading to surgical incision infections in patients undergoing surgical treatment, and strengthening surgical nursing is an important method to control postoperative incision infection. To sum up, the operating room nursing studied in this paper involves multi-level and all-around active intervention, formulating strict plans, taking effective measures, and strengthening the aseptic operation training of operating room nurses. In addition, the qualified rate on washing hands by surgeons reaches full marks, and every effort is made to avoid infections of surgical incisions [5]. Practices show that the surgical wounds in most orthopedic operations are relatively large, so they can easily cause incision infections. If the patients are not treated promptly and effectively, incision infections can easily occur, even resulting in death in severe cases. Therefore, it is particularly important to strengthen the prevention of incision infections during orthopedic operations [6]. In order to further study the clinical effect of nursing intervention in operating rooms on preventing orthopedic wound infections, this study recruited a cohort of 128 orthopedic patients who came to The Second Affiliated Hospital of Xi'an Medical University for treatment from August 2019 to August 2020, and the details are reported as follows.

Table 1. Comparison of the basic conditions of the two groups of patients (n, x̄ ± sd)

Items	Control group (n=64)	Observation group (n=64)	t/χ²	P
Age (years)	44.7±5.7	45.2±5.4	0.532	0.596
Average weight (kg)	58.26±3.74	58.63±3.69	0.684	0.403
Gender				
Male	30	33	0.281	0.868
Female	34	31		
Whether you have high blood pressure				
Yes	33	32	0.031	0.860
No	31	32		
Whether you have diabetes				
Yes	33	30	0.281	0.868
No	31	34		
Obesity				
Normal	11	12	0.041	0.840
Obesity	25	24		
Mild obesity	16	17		
Severe obesity	12	11		
Orthopedic surgery grade				
Grade I	12	13	0.041	0.840
Grade II	24	25		
Grade III	17	16		
Grade IV	11	10		
Whether to routinely use preventive antibiotics				
Yes	32	33	0.031	0.860
No	32	31		
Operation time (h)	2.85±1.22	2.93±1.18	0.562	0.471
Intraoperative blood loss (mL)	61.53±4.15	61.77±4.09	0.184	0.821
Intraoperative blood transfusion (mL)	62.15±5.65	61.89±5.61	0.245	0.831

Materials and methods

General information

From August 2019 to August 2020, 128 orthopedic patients who came to The Second Affiliated Hospital of Xi'an Medical University for surgery were recruited as the study cohort and randomly divided into the observation group or the control group, with 64 cases in each group. All the patients met the surgical indications, and the study was approved by the Ethics Committee of The Second Affiliated Hospital of Xi'an Medical University. All the patients voluntarily signed the informed consent forms. Patients with severe mental illnesses, surgical contraindications, communication disorders, other serious organic or hematological diseases, malignant tumors or serious abnormalities of heart, lung, liver, or kidney function were excluded. The control group applied conventional nursing in the operating room, while the observation group applied standardized nursing in the operating room. There were no significant differences in the basic clinical data between the two groups (P>0.05, **Table 1**).

Methods

Control group: Control group: The control group adopted routine nursing measures in orthopedics, mainly focused on cooperation on the basis of operation implementation and the handover work with ward nurses after the operation [7, 8].

Observation group: In addition to routine nursing, the following nursing measures were taken for the observation group: (1) Operating

environment intervention: The cleanliness and comfort of the operating room were ensured, the clothes were disinfected and changed in strict accordance with the aseptic operation of the operating room, the room temperature was controlled at 26°C when giving anesthesia to patients, and the humidity at the beginning of the operation was controlled at about 50%, while the room temperature was controlled at 23°C. (2) Heat preservation nursing intervention: As the operation time is relatively long, the patients are prone to show low temperatures after their operations, and they may even have coagulation dysfunction, which may affect immune function. Therefore, it is advisable to keep the operating table temperature at 37.5°C before the operation, and pay attention to keeping the body temperature around 37.5°C during infusions to ensure the patient's respiratory tract temperature and humidity are constant. (3) Instrument delivery: The process of instrument delivery was strictly regulated to reduce the overall operation time. (4) Surgical instruments and prostheses intervention: Instruments and prostheses were carefully cleaned and sterilized during the operation. For foreign instruments, high pressure sterilization and enzyme washing were carried out to ensure the sterility of the instruments. One day before each operation, the prostheses to be used in the operation were sent to the operating room, and the relevant personnel checked and disinfected the prostheses to ensure the integrity of the outer packaging. (5) The allocation of the medical staff and matters needing the patients' attention: The hospital should improve the allocation of the medical staff, optimize the operation nursing procedures, strictly control the frequency of the medical staff entering the operating room, and reduce indoor air convection to ensure a clean environment [9, 10].

Outcome measures

Main outcome measures: (1) The degree of wound healing after each operation was recorded, and the wound healing grades were divided into Grade A healing, Grade B healing, and Grade C healing. Grade A healing means excellent healing without any adverse reactions. Grade B healing refers to a slight inflammatory reaction at the healing site, such as induration, redness, swelling, hematoma, and effusion, but there is no suppuration. After

active treatment, primary healing can be achieved. Grade C healing refers to suppuration at the incision site, which requires an incision and drainage before it can be completely healed, and this is more common in some purulent diseases.

(2) The eating and getting out of bed times, and the lengths of the hospital stays were compared between the two groups.

(3) The incidences of postoperative wound infection were recorded (the incidence of postoperative wound infection = cases of postoperative wound infection/total cases * 100.00%).

Secondary outcome measures: (1) Each patient's quality of life at discharge was recorded, including physical functioning, psychological function, social function and material life. A higher score indicates a higher quality of life.

(2) When discharged from the hospital, the nursing satisfaction was evaluated with a self-made questionnaire, which mainly focused on nursing work attitudes, the level of the professionalism, the degree of care, the diagnostic and treatment environment, the diagnostic and treatment skills and was classified as satisfied, basically satisfied, and dissatisfied, with nursing satisfaction = (satisfied + basically satisfied)/total cases * 100%.

Statistical analysis

SPSS 22.0 was used for the data analysis, and the measurement data were tested for normality. Data with a normal distribution were represented as the mean ± standard deviation ($\bar{x}$ ± sd). Independent sample t tests were used for the comparisons between groups, and paired t tests were used for the comparisons before and after the treatment. The count data were represented as number/percentage (n/%) and analyzed using chi-square test. P<0.05 means the difference is statistically significant.

Results

Comparison of the basic conditions between the two groups of patients

There were no significant differences in the basic data between the two groups (P>0.05), and the details are shown in **Table 1**.

Table 2. Comparison of postoperative incision healing between the two groups (n, %)

Groups	Healing		
	Grade A	Grade B	Grade C
Control group (n=64)	53 (82.81)	7 (10.94)	4 (6.25)
Observation group (n=64)	64 (100.00)	0 (0.00)	0 (0.00)
χ^2	6.684	4.467	5.033
P	0.001	0.003	0.002

Table 3. Comparison of the clinical nursing indicators between the two groups ($\bar{x} \pm sd$)

Groups	Eating time after operation (h)	Time to get out of bed (h)	Hospitalization time (d)
Control group (n=64)	28.09±5.25	28.09±2.86	29.43±4.09
Observation group (n=64)	25.54±4.14	23.73±2.19	25.71±3.47
t	3.051	9.683	5.548
P	0.003	0.000	0.000

Table 4. Infections in the two groups of patients (n, %)

Groups	Incidence of incision infection
Control group (n=64)	14 (21.88)
Observation group (n=64)	0 (0.00)
χ^2	15.719
P	0.000

Comparison of the postoperative wound healing between two groups

The grade A incision healing rate in the observation group was significantly higher than the rate in the control group (P<0.01). The details are shown in **Table 2**.

Comparison of the clinical nursing indicators between the two groups

The eating and getting out of bed times and the lengths of the hospital stay in the observation group were significantly shorter than they were in the control group, and the differences between the two groups were statistically significant (P<0.01). The details are shown in **Table 3**.

Comparison of the incidences of postoperative incision infections between the two groups

The incidences of postoperative wound infections in the observation group (0 cases) was significantly lower than they were in the control group (14 cases, accounting for 21.88%), and the difference was statistically significant (P<0.001). The details are shown in **Table 4**.

Comparison of the prognoses and quality of life scores between the two groups

Before the nursing, there was no significant difference between the observation group and the control group in the prognoses and quality of life scores (P>0.05). After the nursing, the prognoses and quality of life scores in the observation group were significantly better than they were in the control group, and the differences were statistically significant (P<0.01). The details are shown in **Table 5**.

Comparison of the nursing satisfaction between the two groups of patients

After the treatment, the overall satisfaction of the patients in the observation group (98.44%) was significantly higher than it was in the control group (84.38%), and the difference was statistically significant (χ^2=27.349, P=0.000). The details are shown in **Figure 1**.

Discussion

The occurrence of infections in hospitals is the main factor affecting patient prognosis, and such infections may result in prolonged illnesses. Determining how to more effectively reduce the incidences of infection has become an urgent problem to be solved in surgery [11, 12].

There are many factors that cause incision infections in orthopedic surgery, such as patients' low immunity, improper operations, and stress reactions. Incision infections will not only affect the success of the operation and delay patient recovery, but it also easily causes other complications and threatens the life safety of patients. Therefore, it is very important to strengthen the prevention of incision infections during orthopedic surgery. Incision infections are a common complication of or-

Table 5. Comparison of the quality of life scores between the two groups of patients before and after the nursing ($\bar{x}$ ± sd, score)

Groups	Before nursing	After nursing	t	P
Control group (n=64)	44.72±5.67	63.22±5.47	5.412	0.001
Observation group (n=64)	45.24±5.39	82.26±4.71	5.248	0.000
t	0.677	5.345		
P	0.731	0.001		
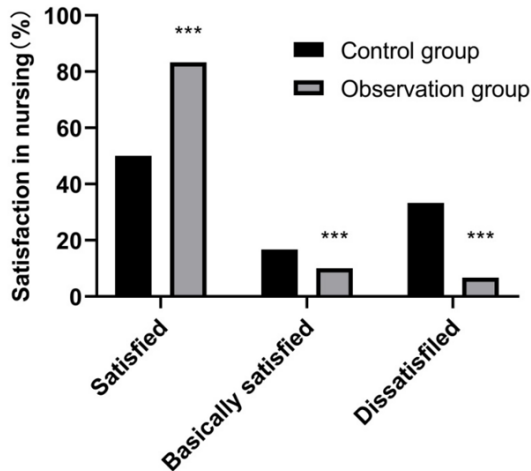
Figure 1. Comparison of the patient satisfaction between the two groups. Compared with the control group, ***P<0.001.

thopedic surgery, and they affect patient prognosis and lead to prolonged hospitalizations [13]. Previous studies have found that under the conventional nursing mode, the possibility of incision infections in patients can be more than 10%, and the hospital stays are also very long [14, 15]. Nursing interventions in the operating room can reduce the incidence of incision infection by 5%-8%, and the patient's nursing satisfaction can exceed 90% [16]. The hospital stay and functional recovery times are shorter, and they are reduced by 10%-30% compared with routine nursing [17]. Studies have shown that the operating room is a high-risk infection area of the hospital, 1% of fault may cause 100% of failure, and patients may have infections after orthopedic surgery. Standardized nursing links all aspects of nursing work closely, and it can effectively improve this situation [18].

Some scholars have analyzed the effect of nursing interventions in operating rooms to prevent incision infections in elderly orthopedic surgery and found that nursing interventions in operating rooms can effectively prevent and reduce the occurrence of infections and improve patients' quality of life and prognoses [19]. In our study, the grade A incision healing rate (100%), the postoperative wound infection rate (0 cases), the prognosis quality of life score (82.26±4.71) and the overall satisfaction degree (98.44%) of the patients in the observation group were all higher than they were in the control group. In addition to the above measures, the application of targeted nursing directly reduces the occurrence of incision infections. At the same time, the patient-centered nursing intervention in the operating room also improves the patients' identification with nursing work, and the lower incidence of complications shortens the hospitalization times and the intestinal function recovery times, which plays an outstanding role. It can be seen that the operating room is the best place to treat patients undergoing orthopedic surgery, and the quality of nursing in the operating room will directly affect the outcome of the whole operation and the incidence of wound infections. In the process of nursing intervention in the operating room, the nursing staff should strengthen the visit and the psychological intervention before the operation, which can effectively resolve the doubts of patients and their families in time and improve the cooperation degree of the patients [20]. During the operation, by strengthening the management of the operating room, strictly carrying out aseptic operations, strengthening the disinfection of objects in the operating room, and carrying out heat preservation care for patients, the amount of bleeding during the operation can be reduced, which is beneficial to the wound healing in the later period among patients after their surgery. After the operations, the patients' incisions were washed promptly, and their wounds were covered with dressings with a strong adsorption force, which can prevent wound infections and promote wound healing [21]. However, as this study only investigated part of the process, and the range involved was relatively small, the application value of nursing intervention in the operating room to prevent orthopedic wound infections is still not deep enough, so further research should be applied in future applications.

To sum up, operating room nursing intervention is effective in preventing orthopedic wound infections and can help patients establish a healthy lifestyle, help patients control related indicators, and reduce postoperative infections. Therefore, operating room nursing is worthy of application and promotion in the nursing management of orthopedic patients.

Disclosure of conflict of interest

None.

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