Effects of Nursing Intervention in Operating Room on Incision Infection and Postoperative Quality of Life in Patients Undergoing Gastrointestinal Operation

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Abstract

Objective: To explore the application value of nursing intervention in operating room in patients undergoing gastrointestinal operation.

Methods: A total of 106 patients who underwent gastrointestinal operation in our hospital from February 2018 to December 2019 were collected as research objects. Thereinto, 50 received conventional nursing and 56 received OR nursing during perioperative period. The surgical incision infection and inflammatory factor level indicators were analyzed, and the quality of life and nursing satisfaction were assessed.

Result: Incision secretion were compared between the two groups. SAS, SDS scores and operation-related is: The incidence of surgical incision infection and the level of inflammatory factors in the observation group (OG) were dramatically lower than those in the control group (CG), and the scores of SAS and SDS were remarkably lower than those in the CG. The time of wound healing, intestinal function recovery, getting out of bed and operation in the OG were obviously shorter than those in the CG, and the quality of life and nursing satisfaction were markedly higher than those in the CG (All P<0.05).

Conclusion: OR nursing can effectively reduce the incidence of postoperative incision infection and improve the quality of life in patients undergoing gastrointestinal operation, which is worthy of clinical promotion.

Keywords: operating room nursing, gastrointestinal operation, surgical incision infection, quality of life

Introduction

Gastrointestinal operation is any surgery on esophagus, stomach, small intestine, colon, rectum or anus (Chapman et al.,2018). It is widely used clinically, but many patients will have surgical site infection (SSI) after operation (Thomas H,2018). SSI can cause pain and discomfort, increase hospital stay,

the risk of secondary infection complications and death as well as the medical economic burden (GlobalSurg Collaborative,2017). Infection management in operating room is a vital measure to prevent and control nosocomial infection (Laurikainen et al.,2016), so OR nursing intervention in gastrointestinal operation is particularly important to improve the prognosis of patients (Chen et al.,2017). With the development of modern medicine and nursing, the OR nursing model has undergone many reforms. In Europe and America, it has developed into a patient-centered multi-expert team (D and Jocelyn ,2017). Nurses' responsibilities are becoming more and more

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extensive, and it has developed into high-quality nursing for patients during the whole perioperative period (Niu et al.,2017). High-quality nursing is a new nursing mode born with the continuous improvement of medical level and the increasing demand of patients for medical level and service. It is different from the traditional nursing mode, that is, it systematizes nursing mode, takes people as the core, clarified nursing philosophy and responsibilities, and applies professional knowledge, operation and attitude to provide a scientific and efficient nursing for patients to help them recover (Henke et al.,2016;Rosen et al.,2018). Operating room operation is relevant to nursing work, and many nursing problems are involved in the operation process. OR nursing provides patients with a more comfortable operation process and accelerates their postoperative rehabilitation (Cottingham et al.,2018; Kroning and Maureen,2017). Zhao et al. (Zhao,2019) reported that providing OR comfort care for patients undergoing general surgery could improve the surgical effect and patients' satisfaction with nursing work. At present, there are few clinical studies on the application of OR nursing in patients undergoing gastrointestinal operation, and we still don't know the influence of OR nursing on postoperative SSI. Therefore, this study will provide OR nursing for patients during gastrointestinal operation, and explore its influence on SSI and quality of life.

1 Data and methods

1.1 Clinical data of patients

A total of 106 patients who underwent gastrointestinal operation in our hospital from February 2018 to December 2019 were collected as research objects. Among them, 50 received conventional nursing and 56 received OR nursing during the perioperative period. Patient inclusion criteria: those who met the indications of gastrointestinal operation; > 18 years old and < 75 years old; those had complete clinical data; those who cooperated with treatment; patients and their families knew the facts and signed an informed consent form. Exclusion criteria: those had severe liver and kidney dysfunction; those who were complicated with mental illness; those had communication disorder; pregnant women; breastfeeding women; the infected. This study was approved by the Medical Ethics Committee of our hospital.

1.2 Nursing methods

Patients in the control group (CG) underwent conventional nursing intervention, psychological intervention and health education were done before operation, the principle of aseptic operation was strictly followed during operation, and doctors were assisted in choosing the appropriate body position, and the vital signs of patients were closely monitored. After operation, they were given various guidance such as diet and medication.

Those in the observation group (OG) were given OR nursing intervention on the basis of the CG, including: (1) Before operation, a special OR nursing team was set up to train related knowledge of OR nursing. Nurses actively communicated with patients to eliminate their negative emotions; patients should be given disease knowledge, surgical efficacy, precautions and adverse complications, so as to strengthen their awareness of surgery and improve their compliance. (2) Preparation for operation: the operation area was strictly disinfected; the operating room temperature was controlled at 22℃-25℃ and the humidity was at 50%-60%. The medical staff should wash their hands in strict accordance with the requirements, and move in the sterile area after changing the surgical clothes. After the patients entered the operating room, they should be fully informed of the operating room environment, anesthesiologist and attending physician, as well as points for attention before such operations. (3) During the operation: attention should be paid to protecting the skin of the patient's operation area and strengthening the warmth during the operation, helping him to adjust the proper title, and the surgical instruments should be disinfected strictly based on the requirements and qualified before being used. After the abdominal cavity was opened, the incision was protected by clean bags in time, so as to prevent digestive juice and bacteria from polluting the incision and surrounding tissues. After the peritoneal incision was sutured, it was washed with 50-150 mL povidone iodine solution at 2500 mg/L. After the liquid was sucked with an aspirator, the incision was rinsed with normal saline and wiped clean with dry sterile gauze. The wound after suture was covered with highly absorbent

dressing. During the operation, patients should be given broad-spectrum antibiotics according to the doctor's advice to prevent infection. (4) After operation: the incision was cleaned and disinfected, and its healing was observed regularly. Antibiotics were employed in view of doctor's advice to prevent infection.

1.3 Enzyme-linked immunosorbent assay (ELISA)

Based on the clinical inspection procedures, the wound secretions of patients in both groups were collected and made into specimens after operation, and the expression levels of interleukin-6 (IL-6), tumor necrosis factor-α (TNF-α) and C-reactive protein (CRP) were detected by ELISA. Sample well, standard well and blank well to be tested were set up. No enzyme-labeled reagents and samples were added to the blank wells, and 100 μl samples or standards were added to others. After being mixed, the enzyme-labeled plate was covered with a film and incubated 2 h at 37℃. The liquid in each well was discarded, and 100 μl working solution A was added to each well and incubated 1 h at 37℃. The liquid in each well was discarded and washing liquid was added to clean the plate for 3 times. Then 100 μl working solution B was added to each well and incubated 1 h at 37℃; the liquid in each well was discarded and washing liquid was added to clean the plate for 3 times. Finally, 90 μl substrate solution was added to each well and put in a dark place to develop 10-15min at 37℃; 50 μl stopping solution was added to each well to finish the reaction. The OD value of each well was detected at the wavelength of 450nm, and the sample concentration was counted.

1.4 Outcome measures

Main outcome measures: the surgical incision infection in both groups, the level of inflammatory factors in surgical incision secretion, the quality of life of patients before nursing and one month after nursing were observed, and the nursing satisfaction was evaluated by using the Nursing Satisfaction Questionnaire made by our hospital. Nursing satisfaction = (satisfied+basically satisfied)/total cases×100%.

Secondary outcome measures: the negative emotions of the two groups before and after nursing intervention were evaluated and compared by SAS (Chen et al.,2017) and SDS (Liu et al.,2018)

self-rating scales. The total score of SAS/SDS below 50 indicated normal, and the higher the score was, the more serious anxiety/depression was. The operation-related indicators of both groups were observed.

1.5 Statistical analysis

The collected data were statistically analyzed by SPSS20.0 (SPSS Co., Ltd., Chicago, USA), and the pictures were drawn by Graphpad Prism 7 (GraphPad Software Co., Ltd., San Diego, USA). The usage rate of counting data (%) was analyzed by Chi-square test and expressed by X2. The measurement data were expressed by mean±standard deviation (Meas±SD), and the comparison between the two groups was assessed by independent-samples T test, all of which were expressed by t, and P<0.05 was regarded as statistically remarkable.

2 Results

2.1 Comparison of general clinical data

There was no statistical difference in gender, age, body mass index (BMI), ASA grade, disease constitution, educational level, place of residence, history of smoking and drinking between the two groups (P>0.05), but it was comparable, as shown in Table 1.

2.2 Comparison of surgical incision infection

By comparing the surgical incision infection between the two groups, we found that the incidence of incision infection in the OG was dramatically lower than that in the CG (P<0.05), as shown in Table 2.

2.3 Comparison of inflammatory factors in surgical incision secretion

By detecting the levels of inflammatory factors in postoperative incision secretion of patients in both groups, we found that the levels of IL-6, TNF-α and CRP in incision secretion of patients in the OG were dramatically lower than those in the CG (P<0.001), as shown in Figure 1.

2.4 Comparison of SAS and SDS scores between the two groups

By evaluating SAS and SDS scores before and 30 min after operation, we found that there was no

marked difference in the two scores before operation (P>0.05), but those scores were remarkably lower than those before nursing (P<0.001). And the two scores in the OG were dramatically lower than those in the CG (P<0.001), as shown in Figure 2.

2.5 Comparison of operation-related indicators between the two groups

We evaluated the operation-related indexes of patients in the two groups, and discovered that the time of incision healing, intestinal function recovery, getting out of bed and operation in the OG were dramatically shorter than those in the CG (P<0.001), as shown in Table 3.

2.6 Comparison of quality of life

The quality of life of patients before nursing and one month after nursing was evaluated by QOL scoring scale. It was found that there was no remarkable difference in the scores before nursing (P>0.05), but those increased markedly after nursing (P<0.05), and the scores of the OG were dramatically higher than those of the CG (P<0.001), as shown in Table 4.

2.7 Comparison of nursing satisfaction

Evaluation of nursing satisfaction of patients in the two groups manifested that the nursing satisfaction of the OG (89.29%) was dramatically higher than that of the CG (70.00%) (P<0.05), as shown in Table 5.

Discussion

Gastrointestinal operation is still challenging because of potential complications such as life-threatening infection and anastomotic leakage (Guyton et al.,2017). SSI brings great health problems and economic burden to patients after operation (Bhangu and Aneel,2018), so OR nursing intervention in gastrointestinal operation is particularly important to improve their prognosis.

In this study, patients who received conventional nursing during perioperative period of gastrointestinal operation were included in the CG, and those who received OR nursing were included in the OG. We compared the surgical incision infection between the two groups and discovered that the incidence of surgical incision infection in the OG was dramatically lower than that in the CG,

which indicated that OR nursing could effectively reduce the incidence of surgical incision infection compared with conventional nursing intervention. Tan (Tan ,2018) and Zheng (Zheng et al.,2018) et al. confirmed that OR nursing had remarkable effect in reducing the incidence of postoperative infection in patients undergoing orthopedic surgery, similar to our research results. It might because the nursing staff disinfected and cleaned the operation area before operation, strictly followed the operation procedure and aseptic principle during operation, cleaned the operation incision regularly after operation, and treated patients with antibiotics according to the doctor's advice, which accelerated the healing of the incision and reduced the incidence of infection. IL-6 (Uciechowski and Dempke,2018) and TNF-α (El-Tahan et al.,2016) are proinflammatory cytokines, which play a vital role in the pathogenesis and inflammatory reaction of many diseases. CRP is a reactive protein in acute phase, and its expression level increases with inflammation. In the acute phase of inflammation or infection, it is mainly induced by IL-6's effect on the gene responsible for CRP transcription (Nehring et al.,2018). Thus, we detected the levels of IL-6, TNF-α and CRP in incision secretion of patients in both groups, and found that the level of inflammatory factors in incision secretion of patients in the OG was dramatically lower than that in the CG. This may be due to the close monitoring and all-round disinfection of patients' vital signs by OR nursing, and strict adherence to the aseptic operation principle in the treatment of patients' surgical sites to reduce infection. Inflammation is the host's protective response to infection and tissue damage. Under normal circumstances, it is beneficial to the host, but the imbalance of inflammatory response will lead to excessive or persistent tissue damage, which will lead to acute or chronic inflammatory disease development (Gammoh and Rink,2017; Sproston and Ashworth,2018; Basil and Levy,2016). Therefore, we believe that the incidence of surgical incision infection in the OG is lower than that in the CG, which is also due to the lower level of inflammatory factors, the lower degree of inflammatory reaction and the reduction of infection.

Proinflammatory factor is a kind of signal molecular, which helps to coordinate the inflammatory response to disease injury or

infection (Moieni and Eisenberger,2018). However, high levels of inflammatory factors may increase people's negative emotions and reduce their life satisfaction (Ironson et al.,2018). Hence, we evaluated the negative emotions of patients in the two groups, and found that the scores of SAS and SDS in the OG were dramatically lower than those in the CG after nursing, which indicated that OR nursing could improve the psychological quality of patients remarkably. This may be because we give patients psychological care and health education before and after operation, so as to reduce their bad emotions such as fear and anxiety. Studies have shown that the personalized nursing model gives psychological intervention to patients, which can not only reduce their discomfort, but also eliminate their negative emotions to the greatest extent (Wu et al.,2018; Wang et al.,2016), similar to our research results. Then, we evaluated the operation-related indexes of the two groups. The results manifested that the time of incision healing, intestinal function recovery, getting out of bed and operation of the OG were dramatically shorter than those of the CG. This showed that OR nursing could effectively improve surgery progress and speed up the recovery of patients. It may be because OR nursing improves patients' psychological quality and provides related health education to them, thus improving their treatment compliance and confidence, strictly taking measures of preventing infection during operation, reducing the incidence of infection and speeding up rehabilitation. Then we compared the quality of life between the two groups, and the results showed that the quality of life in the OG was dramatically higher than that in the CG. Ke et al. (Ke et al.,2019) reported that humanized nursing in operating room was beneficial to reduce the incidence of postoperative infection and operation pressure, and improve the psychological state of patients and nursing satisfaction. In the end, we compared the satisfaction of patients in both groups with nursing work, and the results were consistent with our expectation. The nursing satisfaction of the OG was dramatically higher than that of the CG, which indicated that OR nursing gained good benefits in clinical application and was recognized by most patients, worthy to be popularized

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This study confirmed that OR nursing could provide obvious benefits for patients undergoing gastrointestinal operation, but there are still some shortcomings. Compliance of patients has not been investigated, which needs to be further supplemented in future studies.

To sum up, OR nursing can effectively reduce the incidence of postoperative incision infection in patients undergoing gastrointestinal operation and improve their quality of life, which is worthy of clinical promotion.

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Table 1. **Comparison of general clinical data between both groups**

Group		Control group (n=50)	Observation group (n=56)	$\chi 2$ /t	P
Gender					
	Male	23 (46.00)	32 (57.14)	1.314	0.252
	Female	27 (54.00)	24 (42.86)		
Age (years)		42.8±8.1	44.3±7.5	0.990	0.325
BMI (kg/m2)		21.52±2.17	22.04±2.21	1.469	0.145
ASA grading					
	Grade I	23 (46.00)	31 (55.36)	0.926	0.336
	Grade II	27 (54.00)	25 (44.64)		
Disease constitution					
	Acute peritonitis	12 (24.00)	9 (16.07)		
	Acute appendicitis	17 (34.00)	25 (44.64)		
	Intestinal obstruction	11 (22.00)	10 (17.86)	2.578	0.631
	Gastric cancer	4 (8.00)	7 (12.50)		
	Colorectal cancer	6 (12.00)	5 (8.93)		
Education level					
	< junior high school	22 (44.00)	27 (48.21)	0.189	0.664
	≥ junior high school	28 (56.00)	29 (51.79)		
Place of residence					
	Cities and towns	26 (52.00)	25 (44.64)	0.573	0.449
	Countryside	24 (48.00)	31 (55.36)		
History of smoking					
	Yes	31 (62.00)	29 (51.79)	1.122	0.290
	No	19 (38.00)	27 (48.21)		
History of drinking					
	Yes	29 (58.00)	28 (50.00)	0.680	0.410
	No	21 (42.00)	28 (50.00)		

Table 2. **Comparison of surgical incision infection between both groups**

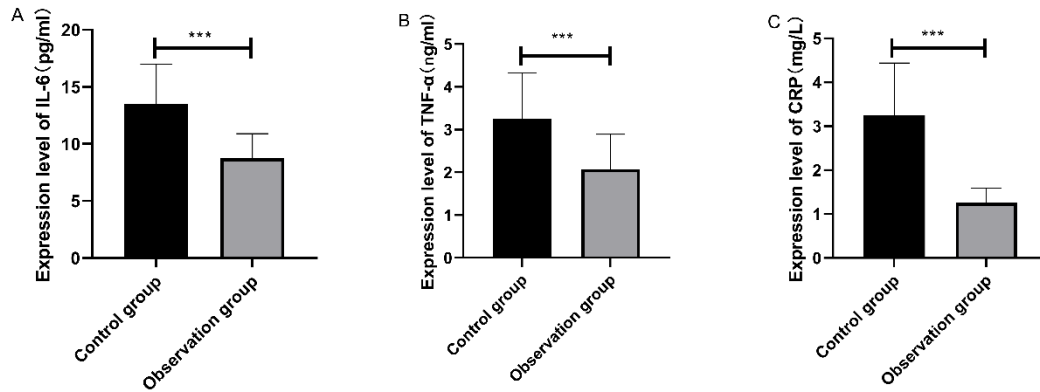| Group	Mild infection	Moderate infection	Severe infection	Total
Control group (n=50)	7 (14.00)	3 (6.00)	0 (0.00)	10 (20.00)
Observation group (n=56)	2 (3.57)	1 (1.79)	0 (0.00)	3 (5.36)
X^2				5.264
P				0.022

Figure 1. **Comparison of inflammatory factors in surgical incision secretion**

A/B/C. The levels of IL-6/TNF-α/CRP in incision secretion of patients in the observation group were dramatically lower than those in the control group. *** means P<0.001.
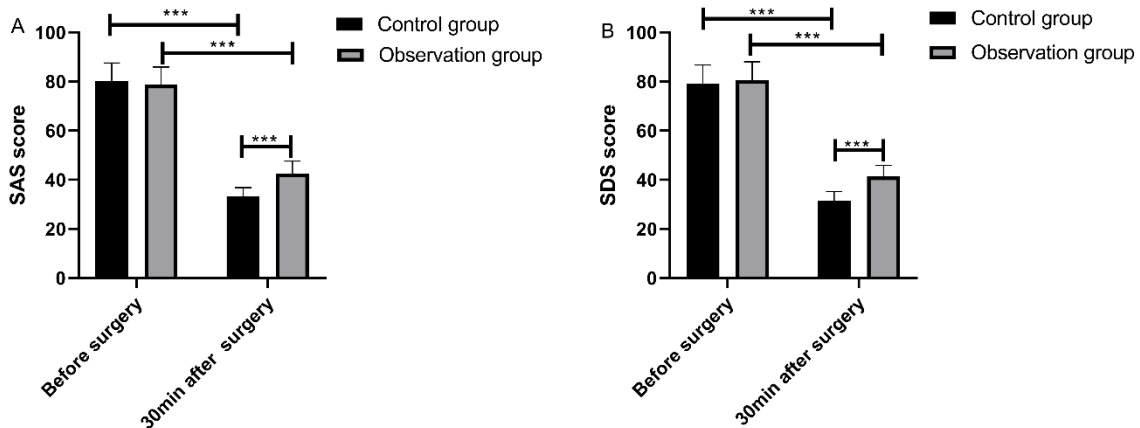

Figure 2. **Comparison of SAS and SDS scores between both groups before and after nursing**

A. There was no marked difference in SAS scores between the two groups before operation, but those decreased markedly 30 min after operation, and the scores of the observation group were dramatically lower than those of the control group; B. There was no marked difference in SDS scores between the two groups before operation, but those decreased remarkably 30 min after operation, and the scores of the observation group were dramatically lower than those of the control group. *** means P<0.001.

Table 3. **Comparison of operation-related indexes between both groups**

Group	Wound healing time (d)	Recovery time of intestinal function (d)	Time of getting out of bed (d)	Operation time (d)
Control group (n=50)	9.12±1.34	2.61±0.48	6.62±0.81	1.39±0.35
Observation group	6.64±1.25	1.92±0.31	4.23±0.72	1.18±0.21

(n=56)				
t value	9.856	8.883	16.08	3.791
P value	<0.001	<0.001	<0.001	<0.001

Table 4. **Comparison of QOL scores after one month of nursing**

Group	Before nursing	One month after nursing
Control group (n=50)	345.34±33.52	795.65±48.57*
Observation group (n=56)	356.57±38.85	921.36±45.47*
t value	1.584	13.76
P value	0.116	<0.001

Table 5. **Nursing satisfaction of patients in the two groups**

Group	Satisfied	Basically satisfied	Dissatisfied	Total satisfaction
Control group (n=50)	13 (26.00)	22 (44.00)	15 (30.00)	35 (70.00)
Observation group (n=56)	19 (33.93)	31 (55.36)	6 (10.71)	50 (89.29)
χ2 value	-	-	-	6.184
P value	-	-	-	0.013