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Original Article

Effect of systematic nursing on the stress response and recovery of gastrointestinal function in patients undergoing laparoscopic cholecystectomy

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Abstract: Objective: To explore the effect of systematic nursing on the stress response and recovery of gastrointestinal function in patients undergoing laparoscopic cholecystectomy. Methods: A retrospective study was conducted among 102 patients with gallbladder system disease. They were divided into an observation group (n=51, perioperative systematic care) and a control group (n=51, perioperative conventional care) according to a random number table. The clinical indicators, postoperative recovery of gastrointestinal function, and patients' stress response, psychological status and quality of life before and after intervention were compared between the two groups. Results: Compared with the control group, the time to get out of bed for the first time after operation, the recovery time of bowel sounds, and the time of first gas/defecation after operation in the observation group were significantly earlier (all P<0.01), and the hospital stay was significantly shorter (P<0.001). Compared with 12 hours before operation, the serum adrenaline and cortisol levels of the two groups were significantly higher at 48 hours after operation, and the levels in the observation group were lower than the control group (all P<0.001). Compared with 1 day before the operation, the scores of Hamilton Anxiety Scale (HAMA) and Hamilton Depression Scale (HAMD) in both groups were reduced when they were discharged from the hospital, and the scores in the observation group were lower than that of the control group (all P<0.01). Three months after the operation, the scores of Generic Quality of Life Inventory-74 (GQOLI-74) in the two groups increased in all dimensions, and the scores in the observation group were higher than the control group (all P<0.05). Conclusion: Systematic care during the perioperative period of laparoscopic cholecystectomy can alleviate the degree of stress, promote the recovery of postoperative gastrointestinal function, relieve the level of anxiety and depression, and improve the quality of life of patients after discharge from the hospital.

Keywords: Systematic nursing, laparoscopic cholecystectomy, stress response, gastrointestinal function

Introduction

Laparoscopic cholecystectomy is a common treatment for gallbladder diseases such as acute cholecystitis and gallstones etc. [1, 2]. It results in fewer traumas to the body, less bleeding during surgery, and faster recovery [3]. With the improvement of people's quality of life, patients and their families' requirements for quality of care are also rising. In addition to the disease itself, it is also necessary to pay attention to the impact on the patient's psychological state and quality of life. Intraoperative operations with minimally invasive techniques can still lead to the development of stress reactions [4].

Perioperative systematic nursing is a patient-centered, nursing procedure-based on a nursing model that provides patients with a full range of services. It is characterized by a combination of systematic, comprehensive, and scientific principles [5]. Systematic nursing in the perioperative period has been widely used in obstetrics and gynecology, general surgery and other departments, but the clinical application of systematic nursing is mainly focused on the postoperative complications and patient prognosis, with insufficient emphasis on the influence of other indicators of the patient [6, 7]. For example, Fujimura et al. applied systematic nursing to the perioperative nursing work of prostatectomy, and found that it could reduce

the occurrence of postoperative complications and promote postoperative recovery [8]. The current study mainly explored the effect of systematic nursing on the stress response and recovery of gastrointestinal function in patients undergoing laparoscopic cholecystectomy.

Materials and methods

General information

In this prospective study, 102 patients with gallbladder disease who were treated in our hospital from January 2019 to January 2020 were divided into a control group and an observation group according to a random number table, with 51 cases in each group.

The control group was given routine nursing while the observation group was given systematic nursing during the perioperative period. Patients were aged between 30-65 years, and all the included patients had obvious tenderness in their right upper abdomen and had elective laparoscopic cholecystectomy. Those patients were excluded if they had: other serious diseases; coagulation system dysfunction or blood system diseases; mental illness or malignant tumors; participated in other studies at the same time; or patients who were pregnant or breastfeeding. This study was approved by the medical ethics committee of our hospital and all patients signed the informed consent.

Methods

The control group was given routine nursing care during the perioperative period, including perfecting various examinations before surgery, closely monitoring the patient's vital signs during surgery and routine anti-infection treatment after surgery [9].

The observation group was given systematic nursing care during the perioperative period:

1) Preoperative care: preoperative education: the nursing staff explained to patients in layman's terms about the disease and the advantages and treatment effects of laparoscopic cholecystectomy, and used pictures and videos to let patients know about postoperative precautions and possible complications; psychological counseling: the nursing staff would communicate with patients frequently to eliminate their fear of surgery, so that they could undergo surgery in their best state [10].

2) Intraoperative care: during surgery, the nursing staff would keep the patient warm, monitor changes in the patient's vital signs using an electrocardiographic monitor, give low-flow oxygen, and maintain a free flow of breath.

3) Postoperative care: monitoring vital signs: the nursing staff would record the patient's blood pressure and pulse every four hours after the operation until the vital signs were stable; drainage tube management: the nursing staff would properly fix the drainage tube to avoid folding or bending, and pay attention to the properties, color and amount of drainage fluid; psychological care: for the doubts raised by patients, the nursing staff would promptly use a plain and understandable language to answer them, soothe patients' emotions and increase their confidence in overcoming the disease [11]. For patients with obvious psychological problems, the nursing staff would promptly give targeted psychological counseling to eliminate or relieve their negative emotions; rehabilitation care: the nursing staff would encourage patients to get out of bed as soon as possible and assist them in their daily life; dietary instrument: the nursing staff would guide the patient to use a small amount of liquid or semi-liquid diet on the second day after surgery, and then gradually transition to a normal diet; discharge guidance: before the patients were discharged from the hospital, the nursing staff would explain in detail the precautions after discharge, the dosage of drugs, the methods and the dietary issues that needed attention.

Outcome measures

Main outcome measures: We compared clinical related indicators (operation time, intraoperative blood loss, time to get out of bed for the first time after operation, and hospital stay) between the two groups.

We collected about 3 mL of venous blood 12 hours before operation and 48 hours after operation. After centrifugation, the serum was collected and the adrenaline and cortisol levels were detected by ELISA. Originated from China, the kits were purchased from Shanghai Enzymelink Biotechnology Co., Ltd., with article numbers of ml077134 and ml711149, respectively.

We compared the recovery of gastrointestinal function between the two groups of patients,

Table 1. Comparison of general information ($\bar{x}$±sd)

Group	Observation group (n=51)	Control group (n=51)	χ^2/t	P
Gender (n)			1.412	0.235
Male	28	22		
Female	23	29		
Age (years)	45.0±5.4	45.2±6.3	0.172	0.864
BMI (kg/m^2)	23.20±2.88	23.10±2.36	0.192	0.848
Type of disease (n)			0.368	0.832
Gallbladder polyps	18	20		
Gallstone	22	19		
Acute cholecystitis	11	12		
Hb 1 d before surgery (g/L)	117.48±10.04	119.20±9.62	0.883	0.379
Basic disease (n)			0.579	0.749
Diabetes	5	3		
Hypertension	8	7		
Hyperlipidemia	3	4		

Note: BMI: body mass index.

and recorded the recovery time of bowel sounds, the first postoperative time of exhaust, and the first postoperative time of defecation.

Secondary outcome measures: HAMA and HAMD (17 items) were used to assess the mental state of the patients 1 day before surgery and at the time of discharge [12, 13]. A score of HAMA ≥7 points suggested that the patient might be accompanied by anxiety. A score of HAMA <7 indicated that the patient had no anxiety. HAMD scores 7 to 17, suggesting that the patient might be accompanied by depressive symptoms. A score of <7 indicated that the patient had no symptoms of depression. The higher the score, the worse the anxiety and depression was.

GQOLI-74 was used to assess the quality of life of patients 1 day before surgery and 3 months after surgery [14]. The material life status score of the scale was 16 to 80, and the other three dimensions (social function, physical function, psychological function) were all 20-100 points. The higher the score of each dimension, the better the quality of life was.

Statistical analysis

SPSS 20.0 was used for data statistics, count data was expressed as (n, %), and the comparison was expressed by χ^2 test. Measurement data was expressed as ($\bar{x}$±sd), comparison between the same group before and after intervention was performed by paired t test, and comparison between two groups was performed by independent t test. P<0.05 was considered statistically significant.

Results

General information

There was no statistically significant difference in the general information between the two groups of patients (all P>0.05), and as such they were comparable, as shown in **Table 1**.

Clinical related indicators

There was no significant difference in operation time and intraoperative blood loss between the two groups (all P>0.05), but the time of first getting out of bed after the operation in the observation group was significantly earlier (P<0.01), and the hospital stay was significantly shorter (P<0.001), as shown in **Table 2**.

Stress response indicators

There was no significant difference in serum adrenaline and cortisol levels between the two groups before surgery (all P>0.05). Compared with 12 hours before operation, the serum adrenaline and cortisol levels of the two groups were significantly increased at 48 hours after operation, but the observation group was lower than the control group (all P<0.001), as shown in **Table 3**.

Table 2. Comparison of clinical related indicators (n, %)

Group	Operation time (min)	Intraoperative blood loss (mL)	The time of first getting out of bed after the operation (h)	Hospital stays (d)
Observation group (n=51)	43.50±6.66	18.58±4.44	22.20±7.90	4.04±0.99
Control group (n=51)	44.24±6.94	19.10±5.38	27.05±8.84	5.77±1.04
T	0.549	0.532	2.921	8.604
P	0.584	0.596	0.004	<0.001

Table 3. Comparison of stress index levels before and after surgery (ng/L, ($\bar{x}$±sd))

Indicators	Observation group (n=51)	Control group (n=51)	t	P
Adrenaline				
12 hours before surgery	92.22±7.69	91.97±6.94	0.172	0.864
48 hours after surgery	103.02±7.54***	117.49±7.77***	9.544	<0.001
Cortisol				
12 hours before surgery	111.28±6.69	110.84±7.42	0.315	0.754
48 hours after surgery	119.94±7.44***	127.60±8.32***	4.901	<0.001

Note: Compared with 12 hours before operation, ***P<0.001.

Table 4. Comparison of postoperative gastrointestinal function recovery (hours, ($\bar{x}$±sd))

Group	Recovery time of bowel sounds	The time of first gas after operation	The time of first defecation after operation
Observation group (n=51)	9.70±2.22	13.74±3.29	20.03±4.44
Control group (n=51)	13.32±3.27	17.70±4.85	28.38±4.09
T	6.541	4.825	9.878
P	<0.001	<0.001	<0.001

Recovery of gastrointestinal function

Compared with the control group, the recovery time of bowel sounds and the time of first gas/defecation after operation were significantly earlier in the observation group (all P<0.001), as shown in **Table 4**.

Mental state

There was no significant difference in HAMA and HAMD scores between the two groups of patients before operation (all P>0.05). Compared with 1 day before operation, HAMA and HAMD scores of the two groups of patients decreased when they were discharged, and the observation group was lower than the control group (all P<0.01), as shown in **Table 5** and **Figure 1**.

Quality of life

There was no significant difference in GQOLI-74 scores between the two groups of patients before surgery (all P>0.05). Compared with 1 day before surgery, the GQOLI-74 scores of the two groups were increased 3 months after surgery, the observation group was higher than the control group (all P<0.05), as shown in **Table 6**.

Discussion

Laparoscopic cholecystectomy is widely used for the surgical treatment of gallbladder diseases due to its advantages such as having a small incision (usually about 1 cm), less intraoperative bleeding, less pain, and faster postoperative recovery; however, improper perioperative care can still lead to complications and affect patients' postoperative recovery [15, 16].

Intraoperative operation, postoperative pain, and postoperative psychological state can all contribute to postoperative stress, which is extremely unfavorable to patients' postoperative recovery [17, 18]. In the current study, compared with 12 hours before surgery, the serum levels of adrenaline and cortisol were signifi-

Table 5. Comparison of HAMA and HAMD scores before and after intervention ($\bar{x}$±sd)

Indicators	Observation group (n=51)	Control group (n=51)	t	P
HAMA score				
1 day before surgery	7.69±1.04	7.93±1.27	1.044	0.299
On discharge	6.01±1.20***	6.74±1.10***	3.202	0.002
HAMD score				
1 day before surgery	7.98±1.39	7.70±1.40	1.014	0.313
On discharge	6.32±1.06***	6.98±1.10**	3.085	0.003

Note: Compared with 1 day before operation, **P<0.01, ***P<0.001. HAMA: Hamilton Anxiety Scale (HAMA); HAMD: Hamilton Depression Scale.

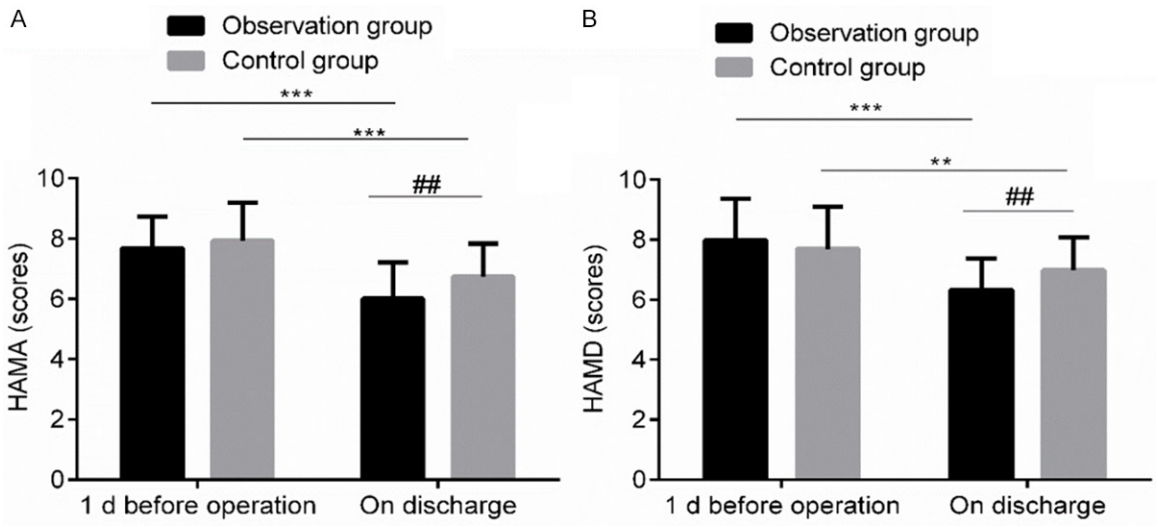

Figure 1. Comparison of HAMA and HAMD scores before and after intervention. A: HAMA score; B: HAMD score. Compared with 1 day before operation, **P<0.01, ***P<0.001; compared with control group, ##P<0.01. HAMA: Hamilton Anxiety Scale (HAMA); HAMD: Hamilton Depression Scale.

cantly higher in the two groups at 48 hours after surgery, but were lower in the observation group than in the control group, suggesting that laparoscopic cholecystectomy did lead to stress in patients. In contrast, perioperative systematic care can alleviate the degree of stress since the psychological state of the patient improved through perioperative systematic care, and the postoperative pain level was also relatively low. Refai et al. also found that careful perioperative care could alleviate stress produced by surgery [19]. Anesthesia before laparoscopic surgery and the establishment of CO_2 pneumoperitoneum during the operation tended to cause gastrointestinal hormonal dysregulation, which in combination with reduced postoperative activity could also lead to gastrointestinal dysfunction [20]. In this study, the recovery time of bowel sounds and the time of first gas/defecation in the observation group were significantly earlier than those in the control group. In the observation group, the time of getting out of bed for the first time after operation was significantly earlier, and the length of hospitalization was significantly shorter, suggesting that the implementation of systematic nursing during the perioperative period of laparoscopic cholecystectomy could effectively promote the recovery of postoperative gastrointestinal function and shorten the length of hospital stay. In this study, systematic nursing after operations was mainly embodied in vital signs monitoring, drainage tube management, psychological comfort, rehabilitation nursing, dietary instrument and discharge guidance. It not only involved the nursing for the operation itself, but it also attached great importance to the nursing work regarding the patient's psychology and postoperative rehabilitation, which was more comprehensive, sys-

Table 6. Comparison of GQOLI-74 scores before and after intervention ($\bar{x}$±sd)

Indicators	Observation group (n=51)	Control group (n=51)	t	P
Social function				
1 day before surgery	70.07±5.06	69.89±5.90	0.165	0.869
3 months after surgery	78.80±5.32***	74.40±5.24***	4.208	<0.001
Psychological function				
1 day before surgery	69.95±5.40	70.03±6.05	0.070	0.944
3 months after surgery	77.79±6.08***	74.49±7.55***	2.431	0.017
Physical function				
1 day before surgery	67.79±6.55	67.06±5.49	0.610	0.543
3 months after surgery	76.08±6.80***	72.10±5.88***	3.162	0.002
Material well-being				
1 day before surgery	50.05±5.55	50.74±6.40	0.582	0.562
3 months after surgery	67.79±6.80***	57.70±5.38***	8.310	<0.001

Note: Compared with 1 day before operation, ***P<0.001.

tematic and scientific, so it was extremely beneficial to the recovery of various functions of the patient after the operation. Zhang et al. pointed out that the more comprehensive postoperative care measures are, the faster the postoperative recovery of patients undergoing laparoscopic surgery [21].

To a certain extent, surgery can lead to the development of adverse psychological states. In severe cases, serious unhealthy mental states such as anxiety or depression may occur. Adverse psychological states have a negative impact on postoperative wound healing and recovery of body functions [22]. In recent years, nursing staff have been paying increasing attention to the psychological guidance of perioperative patients. The results of this study showed that the HAMA and HAMD scores of the observation group were lower than those of the control group at the time of discharge, and the GQOLI-74 scores of all dimensions of the observation group were higher than those of the control group 3 months after the operation, suggesting that during the perioperative period of laparoscopic cholecystectomy, the implementation of systematic nursing can more effectively improve patients' postoperative mental state, relieve their anxiety and depression, and at the same time can significantly improve the quality of life after discharge. In our study, the implementation of systematic nursing involved the psychological counseling of patients before and after the operation. This psychological counseling before the operation helped to eliminate the patient's fear of the operation while postoperative psychological counseling was mostly focused on one-on-one psychological counseling given to patients with clear unhealthy psychology, so it could promote the improvement of their unhealthy psychology after surgery. Kalogianni et al. reported that systematic care during the perioperative period could improve the postoperative mental state of patients and promote postoperative recovery [23].

However, this study had some shortcomings, such as the occurrence of postoperative stress being the result of a combination of factors, and the implementation of systematic nursing was only one of the measures that could relieve the postoperative stress, as such the effective control of postoperative stress needs to be confirmed by extensive clinical research. Additionally, this study was a single-center clinical study with a limited sample size, and a larger-sample multi-center study is still needed in the later stages to confirm the advantages of systematic care.

In summary, perioperative systematic care for laparoscopic cholecystectomy can alleviate the degree of stress, promote the recovery of postoperative gastrointestinal function, relieve anxiety and depression, and improve the patients' quality of life after discharge from the hospital. As such, it is worthy of clinical promotion.

Disclosure of conflict of interest

None.

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