The Value of Refined Nursing Management for Surgical Efficiency, Postoperative Recovery, and Stress Response in Laparoscopic General Surgery

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AIM: The study aimed to explore the impact of refined nursing management in the operating room on surgical efficiency, postoperative recovery, and stress responses in patients undergoing laparoscopic general surgery.

METHODS: A retrospective analysis was conducted on 100 patients who underwent laparoscopic surgery at Zhongnan Hospital of Wuhan University between March 2023 and March 2024. The control group comprised 48 cases receiving conventional operating room nursing, while the observation group comprised 52 cases receiving refined nursing management in the operating room in addition to the conventional care. Comparisons were conducted between the two groups regarding surgical efficiency, postoperative recovery, postoperative stress indicators, psychological status before and after nursing, overall treatment comfort, perioperative complications, and nursing satisfaction.

RESULTS: The observation group showed statistically significant improvements in surgical efficiency, postoperative recovery, and stress indicators compared to the control group. After the intervention, the Self-Rating Anxiety Scale (SAS) and Self-Rating Depression Scale (SDS) scores of both groups significantly decreased compared to pre-nursing levels ($p < 0.05$), while such decrease was notably higher in the observation group ($p < 0.05$). Patients in the observation group reported significantly higher post-nursing comfort levels ($p < 0.05$) and exhibited significantly fewer perioperative complications ($p < 0.05$) compared to the control group. Furthermore, the nurses indicated significantly higher satisfaction with patient care in the observation group ($p < 0.05$).

CONCLUSIONS: Implementing refined nursing in the operating room for laparoscopic general surgery can facilitate the recovery of gastrointestinal function, reduce postoperative recovery time, prevent complications, improve patients' psychological state, and enhance their quality of life.

Keywords: refined nursing management; laparoscopic surgery; surgical efficiency; postoperative recovery; stress response

Introduction

Laparoscopic surgery is a widely adopted minimally invasive surgical technique in clinical practice [1, 2]. Despite its advantages, such as reduced trauma and fewer complications, it can still induce some stress-related injuries in patients [3]. The operating room environment is crucial in maintaining surgical quality and ensuring patient stability. High standards in surgical techniques and nursing levels are essential, as inadequate perioperative nursing can significantly extend the patient's recovery period [4].

The increasing demand for patient comfort during surgeries necessitates enhancing the quality of operating room services [5]. Refined nursing methodologies, which incorporate information technology, optimize service processes, and improve quality and safety measures, have gained significant importance [6]. The patient-centered refined nursing management model has demonstrated the potential to enhance the skills of nursing staff and improve perioperative outcomes [7, 8]. This study investigates the application of refined nursing management in the operating room, focusing on its impact on surgical efficiency, postoperative recovery, and patient stress response in the context of laparoscopic surgery. The potential of this approach to significantly improve the quality of care and patient outcomes warrants further exploration and broader implementation in clinical practice.

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Materials and Methods

Clinical Data

A retrospective analysis was conducted on 100 laparoscopic surgery patients treated at Zhongnan Hospital of Wuhan University from March 2023 to March 2024. The control group (CG, n = 48) received conventional perioperative care, while the observation group (OG, n = 52) received refined nursing management in addition to standard care. Inclusion criteria were: (1) patients meeting indications for laparoscopic surgery [9]; (2) patients with complete medical records; and (3) patients aged over 18 years. Exclusion criteria included malignant tumors, severe organ diseases, or

Table 1. General data [n (%)].

Variables	Observation Group	Control Group	χ^2	p
	n = 52	n = 48		
Gender			0.004	0.948
Male	30 (57.69)	28 (58.33)		
Female	22 (42.31)	20 (41.67)		
Age (years)			0.058	0.809
≤55	24 (46.15)	21 (43.75)		
>55	28 (53.85)	27 (56.25)		
BMI (kg/m^2)			0.037	0.848
≤23	27 (51.92)	24 (50.00)		
>23	25 (48.08)	24 (50.00)		
Smoking history			0.075	0.784
Yes	36 (69.23)	32 (66.67)		
No	16 (30.77)	16 (33.33)		
Drinking history			0.067	0.796
Yes	23 (44.23)	20 (41.67)		
No	29 (55.77)	28 (58.33)		
Surgery type			0.081	0.994
Laparoscopic hiatal hernia repair and gastric plication	18 (34.62)	17 (35.42)		
Laparoscopic gastric leiomyoma resection	15 (28.85)	14 (29.17)		
Laparoscopic fenestration of hepatic cyst	15 (28.85)	14 (29.17)		
Other	4 (7.69)	3 (6.25)		

BMI, Body mass index.

Table 2. Comparison of surgical efficiency between the two groups ($\bar{x} \pm$ SD).

Item	Observation Group	Control Group	t	p
	n = 52	n = 48		
Surgery preparation time (h)	27.33 ± 1.1	40.29 ± 1.44	50.81	<0.001
Surgery duration (min)	191.21 ± 3.31	252.51 ± 4.07	82.90	<0.001
Intraoperative blood loss (mL)	88.47 ± 2.07	103.43 ± 2.47	32.92	<0.001

coagulation disorders. All study participants, or their legal guardian, provided informed written consent prior to study enrollment and the study design followed the Declaration of Helsinki. This study received ethical approval from the Ethics Committee of Zhongnan Hospital of Wuhan University (No.: 2023112k).

Nursing Methods

Control Group

Preoperative Care: health checks were conducted to ensure compliance with laparoscopic surgery indications and preparation of surgical items and instruments.

Intraoperative Care: assistance was provided to the anesthesiologist during anesthesia administration, facilitating the transfer of surgical instruments and materials as required. Vital parameters were continuously monitored, and any deviations from normal ranges were promptly reported.

Postoperative Care: anesthesia recovery was monitored, including assessment of consciousness, hemodynamic stability, and respiratory function. A comprehensive care transition to ward nursing staff was conducted, including detailed documentation of perioperative events and patient status.

Observation Group

In addition to the above, the following refined nursing measures were implemented:

Preoperative Care: execution of operating room cleaning and disinfection; verification of instrument sterilization, perioperative patient education, including elucidation of laparoscopic surgical principles, procedural steps, fasting requirements, patient positioning, and associated precautions; implementation of psychological support strategies to mitigate patient anxiety and increase confidence through discussion of the minimally invasive nature of laparoscopic surgery and presentation of previous successful cases.

Intraoperative Care: temperature maintenance by covering non-surgical areas with clothes or blankets; optimization of fluid management by prewarming of intravenous and irrigation fluids to prevent hypothermia-induced shivering; continuous monitoring of blood pressure and pneumoperitoneum pressure, addressing abnormalities promptly, such as CO_2 release in response to blood pressure rise.

Postoperative Care: rigorous instrument counting to ensure complete retrieval of all surgical items; inspection and confirmation of proper placement of drainage tubes, catheters,

Table 3. Comparison of postoperative recovery between the two groups ($\bar{x} \pm$ SD).

Item	Observation Group	Control Group	t	p
	n = 52	n = 48		
Time to first flatus from anus (d)	2.94 ± 0.28	4.4 ± 0.62	13.37	<0.001
Time to recovery of gastrointestinal function (d)	0.7 ± 0.11	1.83 ± 0.19	36.74	<0.001
Duration of hospital stay (d)	9.57 ± 0.46	13.28 ± 0.94	25.37	<0.001

Table 4. Comparison of physiological stress indicators between the two groups ($\bar{x} \pm$ SD).

Item	Observation Group	Control Group	t	p
	n = 52	n = 48		
Cortisol (mmol/mL)	481.9 ± 9.44	577.25 ± 12.8	42.63	<0.001
Adrenaline (μg/mL)	0.06 ± 0.01	0.11 ± 0.02	16.00	<0.001

and decompression devices; application of abdominal massage techniques to facilitate gastrointestinal function recovery.

Observation Indicators

(1) Comparative analysis of surgical efficiency between the two groups, including preoperative preparation time and surgery duration.
(2) Evaluation of postoperative recovery, including length of hospital stay, time to first flatus, and gastrointestinal function recovery period (defined as the return of normal bowel sounds).
(3) Quantitative comparison of physiological stress response indicators, including serum cortisol and adrenaline levels, measured in early morning fasting stomach via enzyme-linked immunosorbent assay (ELISA).
(4) Assessment of psychological status before and after nursing using the Self-Rating Anxiety Scale (SAS) and Self-Rating Depression Scale (SDS) [9].
(5) Evaluation of patient comfort using the General Comfort Questionnaire (GCQ) [10], a 28-item instrument comprising four dimensions: psychological, physiological, spiritual, and environmental. The GCQ employs a 5-point scale (0–4), with higher scores indicating greater comfort levels.
(6) Documentation and comparative analysis of surgical complications, including infections, adhesive small bowel obstructions, and deep vein thrombosis.
(7) Evaluation of nursing care satisfaction through a standardized questionnaire, with responses stratified into three categories: very satisfied, satisfied, and dissatisfied.

Statistical Methods

The data analysis was conducted using SPSS version 20.0 (SPSS Statistics Inc., Chicago, IL, USA). Continuous variables with normal distribution were expressed as mean ± standard deviation (SD). Between-group comparisons for continuous variables were performed using independent *t*-tests, and within-group pre- and post-intervention differences were assessed using paired *t*-tests. Categorical data were analyzed using chi-square tests. Statistical significance was established at $p < 0.05$ for all analyses.

Results

General Data

The two groups are comparable, with no statistically significant differences observed in gender, age, Body mass index (BMI), or other measured variables ($p > 0.05$, Table 1).

Comparison of Surgical Efficiency between the Two Groups

Compared to CG, the preparation time, duration of surgery, and intraoperative blood loss in the OG were significantly lower ($p < 0.05$, Table 2).

Comparison of Postoperative Recovery Between the Two Groups

Patients in the OG demonstrated statistically significant reductions in the duration of hospitalization, time to first anal exhaust, and gastrointestinal function recovery time compared to the CG ($p < 0.05$, Table 3).

Comparison of Physiological Stress Indicators between the Two Groups

Post-intervention serum concentrations of cortisol and adrenaline were significantly lower in the OG compared to the CG ($p < 0.05$, Table 4).

Comparison of Negative Emotion Scores between the Two Groups

Psychological negative emotions were assessed using the SAS and SDS scales. At baseline, no statistically significant differences were observed between the two groups in SAS (42.48 ± 1.78 *vs* 42.71 ± 1.66, $p = 0.511$) and SDS (41.56 ± 2.23 *vs* 42.35 ± 2.31, $p = 0.083$) scores. Following the intervention, both groups exhibited significant improvements in negative emotion scores (SAS: 22.04 ± 1.84 *vs* 29.31 ± 1.86, $p < 0.05$; SDS: 22.28 ± 1.95 *vs* 29.10 ± 2.08, $p < 0.05$). The OG exhibited more substantial decreases in both SAS and SDS scores compared to the CG ($p < 0.05$ for both SAS and SDS) (Fig. 1).

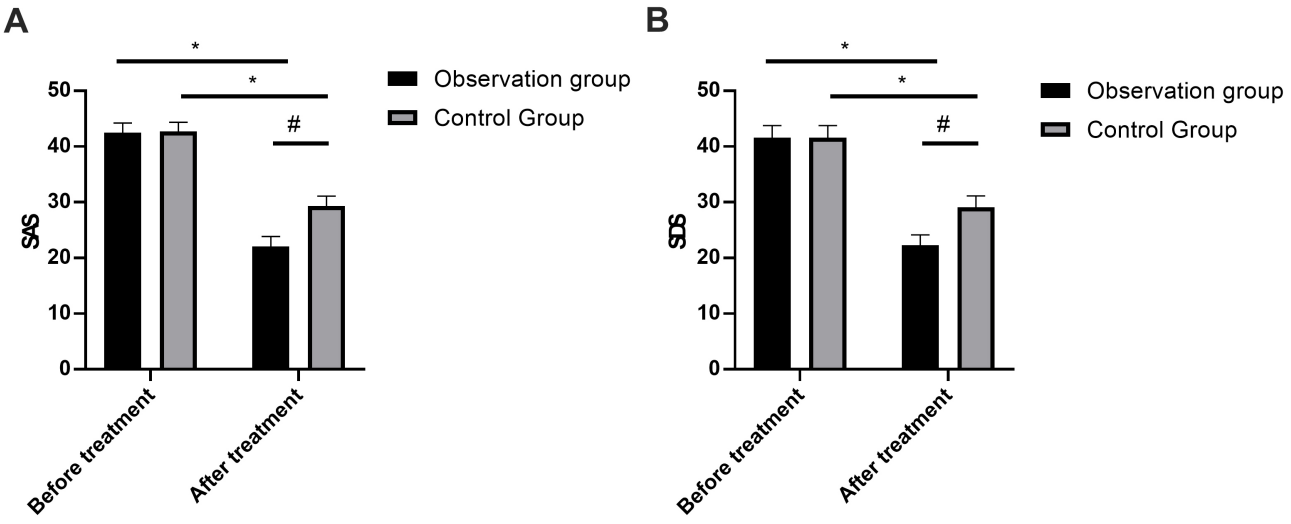

Fig. 1. Comparison of negative emotion scores between the two groups. (A) Comparison of SAS scores. (B) Comparison of SDS scores. * indicates a significant difference within the group before and after treatment ($p < 0.05$); # indicates a significant difference between groups after treatment ($p < 0.05$). SAS, Self-Rating Anxiety Scale; SDS, Self-Rating Depression Scale.

Table 5. Comparison of quality of life between the two groups of patients ($\bar{x} \pm$ SD).

Dimension	Observation Group	Control Group	*t*	*p*
	n = 52	n = 48		
Psychological	21.04 ± 1.04	15.26 ± 1.26	25.09	<0.001
Physiological	18.3 ± 0.83	11.31 ± 1.06	36.86	<0.001
Spiritual	21.23 ± 1.07	13.23 ± 0.95	34.91	<0.001
Environmental	16.85 ± 0.81	12.08 ± 0.89	28.06	<0.001

Comparison of Post-Intervention Quality of Life between the Two Groups

The observation group demonstrated significantly higher scores in the psychological, physiological, spiritual, and environmental dimensions of quality of life compared to the control group, indicating higher overall well-being in the observation group ($p < 0.05$, Table 5).

Comparison of Surgical Complications between the Two Groups

The incidence of surgical complications was significantly lower in the observation group (5.77%) compared to the control group (20.83%) ($p < 0.05$, Table 6).

Comparison of Nursing Satisfaction between the Two Groups

In the observation group, the numbers of patients who reported being very satisfied, satisfied, and unsatisfied with the nursing care were 40, 11, and 1, respectively. In contrast, the control group had 24, 13, and 11 patients in these categories, respectively. The nursing satisfaction rate in the observation group was significantly higher than that in the control group (98.08% *vs* 77.08%, $p < 0.05$, Table 7).

Discussion

Laparoscopic surgery is one of the most common used minimally invasive surgical techniques in the current clinical practice. This approach offers several advantages over traditional surgical methods, including reduced tissue trauma, decreased intraoperative blood loss, lower complication rates, and shorter recovery periods, aligning with the principles of rapid recovery after surgery [11,12]. While laparoscopic surgery is associated with comparatively minimal trauma, it remains an invasive procedure that inevitably induces a degree of physical trauma, potentially impacting postoperative recovery. Therefore, the implementation of effective nursing interventions is crucial for mitigating postoperative complications and accelerating recovery [13].

This study evaluated the efficacy of implementing enhanced perioperative nursing management protocols for patients undergoing laparoscopic surgery, with a focus on postoperative recovery outcomes. The patient-centered nursing model necessitates meticulous and precise nursing care, providing high-quality, targeted nursing services that accelerate recovery [14]. A comparative analysis was conducted to assess surgical efficiency and postoperative recovery metrics between observation and control groups. The observation group exhibited significant improvements

Table 6. Comparison of surgical complications between the two groups [n (%)].

Complications	Observation Group	Control Group	χ^2	p
	n = 52	n = 48		
Infection	1 (1.92)	4 (8.33)	-	-
Adhesive intestinal obstruction	2 (3.85)	4 (8.33)	-	-
Lower extremity venous thrombosis	0 (0)	2 (4.17)	-	-
Total incidence	3 (5.77)	10 (20.83)	5.008	0.025

Table 7. Comparison of nursing satisfaction between the two groups [n (%)].

Group	Observation Group	Control Group	χ^2	p
	n = 52	n = 48		
Very satisfied	40 (76.92)	24 (50.00)	-	-
Satisfied	11 (21.15)	13 (27.08)	-	-
Unsatisfied	1 (1.92)	11 (22.92)	-	-
Satisfaction	51 (98.08)	37 (77.08)	10.42	0.001

in surgical efficiency and postoperative recovery outcomes compared to the control group. These findings suggest that the implementation of refined nursing management in the perioperative environment can enhance surgical efficiency and promote postoperative recovery. The primary mechanism underlying these improvements is hypothesized to be the comprehensive nature of refined nursing management, encompassing a spectrum of detailed nursing tasks (such as precise regulation of operating room temperature and humidity, patient privacy protection, and maintenance of optimal patient thermoregulation). These targeted, high-quality nursing services contribute to creating an optimized surgery, thereby promoting procedural efficiency and accelerating postoperative recovery [15].

Next, we conducted a comparative analysis of physiological stress indicators and negative emotional indicators between the observation and control groups. The results showed that the observation group exhibited statistically significant improvements in postoperative stress parameters and negative emotions compared to the control group. This can be attributed to the implementation of a comprehensive care protocol encompassing preoperative, intraoperative, and postoperative phases. The intervention strategy incorporated the following elements: psychological support, nutritional optimization, and integration of refined management techniques. These interventions demonstrated efficacy in enhancing surgical outcomes and promoted recovery, while also augmenting the professional skills and quality of nursing personnel. Furthermore, they contributed to the optimization of nursing resource allocation and reduction of surgical costs, as well as reduction of patient stress responses [16, 17]. Additionally, specialized preoperative visits facilitates a comprehensive assessment of the patient's condition. Preoperative education and guidance by responsible nurses improved patients' psychological states, reducing depression and anxiety, and increasing confidence in surgical outcomes [18].

Finally, we compared the comfort scores, perioperative complications, and nursing satisfaction between the observation and control groups after intervention. Statistical analysis revealed that the observation group demonstrated significantly higher comfort scores, lower incidence of perioperative complications, and elevated nursing satisfaction compared to the control group. These findings suggest that refined nursing management in the operating room provides a better treatment experience for laparoscopic surgery patients. In the context of preoperative care, strict disinfection of the operating room and laparoscopic instruments can control infection sources, thereby significantly reducing infection rates and associated complications [19]. Furthermore, the implementation of refined nursing management model, which is patient-centered and characterized by optimized nursing procedures, aims to achieve humanized and standardized nursing processes, leading to higher patient comfort and satisfaction [20]. Previous studies have shown that refined nursing in the operating room can improve patient outcomes and satisfaction, similar to our findings [14, 21, 22].

In addition, the study only focused on the impact of refined nursing management on the physical and psychological aspects of patients, without considering the economic burden and cost-effectiveness of this nursing model. Future studies should address these economic aspects to provide more comprehensive data for clinical decision-making. Moreover, the follow-up period in this study was relatively short, necessitating further exploration of the long-term effects of refined nursing management on patient outcomes. Longer-term follow-up and more in-depth analyses are required to fully evaluate the benefits and sustainability of this nursing approach.

Conclusions

In conclusion, applying refined nursing management in the operating room for laparoscopic general surgery can en-

hance the recovery of gastrointestinal function, reduce postoperative recovery time, prevent complications, and improve patients' psychological states and quality of life. This approach is highly beneficial and worth promoting.

Availability of Data and Materials

All experimental data included in this study can be obtained by contacting the first author if needed.

Author Contributions

KZ and GZ performed the research. GZ designed this study. KZ drafted this manuscript. Both authors contributed to important editorial changes in the manuscript. Both authors read and approved the final manuscript. Both authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

All study participants, or their legal guardian, provided informed written consent prior to study enrollment and the study design followed the Declaration of Helsinki. This study received ethical approval from the Ethics Committee of Zhongnan Hospital of Wuhan University (No.: 2023112k).

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Conflict of Interest

The authors declare no conflict of interest.

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