

The Application of Hierarchical Quantitative Management Combined with Sensitive Indicators of Accelerated Recovery Nursing in Patients Undergoing Liver Cancer Surgery

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Abstract

Objective: To analyze the application value of hierarchical quantitative management combined with sensitive indicators of accelerated recovery nursing in patients undergoing liver cancer surgery. **Methods:** A total of 66 patients with liver cancer admitted from 2022 to 2023 were included in the study and the digital lottery group was divided into control group (n = 33) and study group (n = 33), and the perioperative indicators, complication rate, and liver function level [glutamyl transferase (GGT), aspartate aminotransferase (AST), alanine aminotransferase (ALT)] were compared between the groups. **Results:** The first exhaust, first ambulation and hospital stay in the study group were shorter than those in the control group, and the complication rate was lower than that in the control group ($P < 0.05$), the liver function (AST, ALT, GGT) was meaningless in the two groups before and after operation ($P > 0.05$), and the postoperative 3dGGT, AST and ALT in the study group were lower than those in the control group ($P < 0.05$). Conclusion: Hierarchical quantitative management + sensitive indicators of accelerated rehabilitation nursing have high application value.

Keywords

Hierarchical Quantitative Management, Accelerated Recovery Care, Sensitive Indicators, Hepatocarcinoma

1. Introduction

Liver cancer, as one of the most common malignant tumors in China, primarily originates from hepatocytes or intrahepatic bile duct epithelial cells. Its incidence

and mortality rates remain high, posing a serious threat to the life and health of the nation's citizens [1] [2]. Despite the advancements in medical technology, surgical treatment has emerged as the primary option for liver cancer treatment, achieving significant success in extending patients' survival times. However, the postoperative rehabilitation process for liver cancer patients still presents numerous challenges. Due to the complex and often severe nature of the disease, patients frequently require an extended recovery period post-surgery. This process not only inflicts physical pain on patients but also tends to induce psychological issues such as anxiety and depression, significantly impacting their overall quality of life [3]. Given this, the significance of clinical nursing interventions in the postoperative rehabilitation of liver cancer patients has become increasingly evident. Effective nursing interventions not only alleviate patients' physical and mental burdens but also facilitate the consolidation of surgical outcomes and expedite the recovery process. In recent years, the model that integrates hierarchical quantitative management with the establishment of sensitive indicators for accelerated rehabilitation nursing has gradually gained attention, offering a fresh perspective for the postoperative care of liver cancer patients. Hierarchical quantitative management is a scientific nursing management method that emphasizes stratification according to the specific situation of patients and implements personalized nursing measures for patients at different levels. The establishment of sensitive indicators of accelerated recovery nursing is based on the core concept of enhanced recovery after surgery (ERAS), which guides nursing practice and ensures the effectiveness and pertinence of nursing measures by screening and determining sensitive indicators closely related to patients' postoperative rehabilitation [4] [5]. Combining hierarchical quantitative management with sensitive indicators of accelerated rehabilitation nursing can further optimize the postoperative nursing process of liver cancer patients and improve the efficiency and quality of nursing. However, at present, the research on this combination mode is rare, and the clinical guidance experience is relatively scarce. Therefore, it is of great clinical significance and practical value to carry out relevant research and explore the application value of hierarchical quantitative management combined with accelerated rehabilitation-sensitive indicators in patients undergoing liver cancer surgery. In this study, 66 patients with liver cancer surgery in the hospital were selected as the research object. Through the implementation of the nursing mode of hierarchical quantitative management combined with the sensitive indicators of accelerated rehabilitation, the rehabilitation situation, psychological status, complication rate, and other indicators of patients were observed and recorded, aiming to evaluate the promoting effect of this mode on the postoperative rehabilitation of patients with liver cancer surgery and provide a more scientific and effective nursing guidance for the clinic. Through the implementation of this study, we expect to provide more precise and personalized solutions for the postoperative care of patients with liver cancer and further improve the rehabilitation quality and living standard of patients.

2. Information and Methodology

2.1. General Information

A total of 66 patients with liver cancer who were clinically admitted to the hospital from November 2022 to December 2023 were included in the study, and the digital lottery group was divided into the control group (24 males, 9 females, aged 40 - 73 years, with a mean value of (56.95 ± 7.03) years; There were 11 cases with Child-Pugh grade A and 22 cases with grade B liver function. TNM stage: 19 cases of stage II, 14 cases of stage III; The tumor diameter was 2.3 - 5.9 cm, the mean value was (3.97 ± 0.41) cm), and the study group (21 males, 12 females, aged 42 - 73 years, the mean value was (57.04 ± 6.71) years; There were 16 cases with Child-Pugh grade A and 17 cases with grade B liver function. TNM stage: 16 cases of stage II, 17 cases of stage III; The tumor diameter was 2.1 - 5.9 cm, the mean value was (3.59 ± 0.42) cm), and the baseline data between groups were meaningless ($P > 0.05$). The study was approved by the hospital Ethics Committee, ethics number KY202444.

2.2. Inclusion and Exclusion Criteria

Inclusion criteria: meet the diagnostic criteria for primary liver cancer [6], lesion > 2 cm; (AFP) > 400 ng/ml; positive liver biopsy; Liver function Child-Pugh class A/B; TNM stage II - III; Age ≥ 40 years; normal consciousness; Undergo surgery.

Exclusion Criteria: Combined with other malignancies or metastases; Severe organ insufficiency; Mental disorders or combined with depression, anxiety, and other diseases; poor adherence; History of abdominal surgery; Extrahepatic metastases.

2.3. Methods

2.3.1. Control Group

Preoperative: fasting for 10 - 12 hours, fasting for 8 hours, and indwelling gastric tube. The patient was informed of the relevant knowledge of liver cancer and the surgical procedure 1 day before surgery. Intraoperative: Cooperate with the physician for surgery. Postoperatively: Vital signs, gastrointestinal decompression, health education, and medication care within 24 hours. 1 - 7 days after surgery, the incision dressing and drainage tube care were observed.

2.3.2. Study Groups

1) Establish a hierarchical quantitative management specialist nursing team

The attending physician, anesthesiologist, rehabilitation therapist, dietitian, and 6 specialist nurses were included to form an accelerated recovery surgery team. It is divided into three levels: N1 (junior responsible nurse, nursing experience > 1 year), N2 (senior responsible nurse, nursing experience 2 - 4 years), and N3 (responsible team leader, nurse in charge and nursing experience 5 - 7 years). The head nurse served as the team leader, leading the team members to learn hierarchical quantitative management and the establishment of sensitive indicators for accelerated rehabilitation nursing, combining literature review and clinical practice.

2) Nursing plan development

The establishment of sensitive indicators for accelerated rehabilitation nursing was carried out with reference to previous literature and the Chinese Clinical Practice Guidelines for Accelerated Recovery Surgery (2021 Edition) [7], and **Table 1** was prepared.

Table 1. Monitoring items of sensitive indicators for accelerated rehabilitation nursing.

Monitoring Items	Specific Content
Fasting water duration	Fasting for 2 h and 6 h before operation.
Oral 12.5% carbohydrate drinks	Patients were given 800 ml of 12.5% carbohydrate drink 10 h before operation and ≤ 400 ml 2 h before operation.
Early ambulation	On the postoperative day: hip lifting exercise, 6 - 10 in each group within 24 h in ≥ 4 groups, turning over in bed (2 h/time), ankle pump exercise, sitting up in bed, standing by the bed. The first day after operation: according to the activity of the first day, increase the amount of activity, guide the patient to breathe deeply, cough effectively, turn over and pat his back, use a breathing training device, etc. Bedside activities and getting out of bed activities 2 - 3 times/day, 5 - 10 min each time. On the second day after operation: continue to complete the above activities and increase the number of activities. From the third day after operation to discharge. Independently complete daily activities such as eating, dressing, washing and toileting, and activities under the bed (24 h > 3 times, 30 m each time).
Respiratory care	Patients were given postoperative cough and expectoration training guidance. Balloon-blowing training (24 h ≥ 3 groups, 10 min in each group). Patients were instructed to perform active cough training (24 h ≥ 3 groups, 15 min each time).
Gastrointestinal function training	Chewing gum (24 h > 3 times). After awakening from anesthesia, 10 - 15 ml of warm water can be drunk every 30 min.
Early drinking water	In the first 24 h after operation, you can take a liquid diet, such as rice soup, lotus root powder, etc., 30 ml per hour, and the total target dose is not more than 500 ml. In the second 24 hours, you can eat a semi-liquid diet, such as porridge, noodles, etc., 60 ml per hour, with a total target volume of 1000 ml. In the third 24 hours, it can be gradually restored from a half-flow diet to a light diet, such as steamed eggs, fish, etc., 200 ml every 2 hours, with a total target volume of 1500 ml.
Prevention of venous thrombosis	Ankle pump exercise (24 h ≥ 3 groups, 15 min each time). Patients were given lower extremity pressure pumps or elastic socks.
Pain assessment	For patients using an analgesic pump, the pain assessment was performed immediately, 1 hour, 2 hours, 3 hours, 4 hours, 5 hours, and 6 hours after returning to the ward, and then every 4 hours until the pump was removed (the assessment without analgesic pump was performed until 48 hours after operation). If NRS > 3 points, evaluate every hour, take measures, including analgesic measures including nurse authority (such as listening to music, talking, distracting, increasing PCIA pressing frequency, etc.), and report to doctors and anesthesiologists to give multimodal analgesia.

3) Nursing practice

1) Preoperative: a) N1 nurses will assist patients in preoperative electrocardiogram, hemodynamic monitoring, and excretory substance detection, and they will use mind maps to assist patients in completing preoperative examinations and admission education. b) On the basis of the routine nursing of N1 nurses before surgery, N2 nurses should use health knowledge atlases or popular science videos to give patients preoperative education, including preoperative adaptation training

and psychological nursing. c) N3 nurses gave patients detailed management of preoperative standardized monitoring items. A comprehensive nutritional risk score 2002 (NRS2002) [8] was performed, and timely nutritional support treatment was provided when the patient's nutritional risk screening score was ≥ 3 points. Instruct patients to take deep breathing, produce effective sputum, self-assess pain, and get out of bed safely before surgery. Patients are instructed to abstain from drinking for 2 hours before surgery, to delay fasting until 6 hours before surgery, and to eat starchy solid foods [9]. Oral carbohydrate-containing beverages are recommended preoperatively, with 800 mL of 12.5% carbohydrate 10 hours before surgery and 400 mL of ≤ 2 hours before surgery [10]. Preoperative nasogastric tube placement is not routinely placed, routine enemas are not recommended, and preoperative laxatives, such as lactulose, are recommended for patients with severe constipation [11].

2) Intraoperative: prophylactic antibiotics are used 30 minutes before surgery; heating rinsing fluid and other items; The temperature of the patient is controlled at 36°C and the humidity is controlled by about 50% during the operation, and the temperature is kept warm during the operation to prevent hypothermia. Anesthesiologists are responsible for intraoperative anesthesia and fluid management.

3) Postoperative: N1 nurses actively communicate with patients, encourage patients, and use mindfulness therapy to divert patients' attention [12]. N2 nurses closely monitor the patient's vital signs and related indicators 24 hours a day and implement multi-mode individualized analgesia, gastrointestinal function training, and early feeding plans according to the doctor's instructions. On the 1st day after surgery, the patient was encouraged and instructed to get out of bed. N3 nurses monitor sensitive indicators to accelerate recovery, evaluate quality, and ensure the implementation of measures.

2.4. Observation Index

- ① Compare the first exhaust, the first ambulation, and the length of hospital stay.
- ② Compare the incidence of complications such as pulmonary infection and intestinal obstruction.
- ③ 4 ml fasting venous peripheral blood was drawn before operation, 3 d, and 7 d after operation, and the levels of GGT, AST, and ALT were detected by the P800 automatic biochemical analyzer of Roche.

2.5. Statistical Analysis

SPSS 25.0 processed the data, and the measurement data were in line with the normal distribution expressed as (\pm s). The independent sample t-test was used for the comparison between groups, and the count data was expressed as [cases (%)]. The line 2 test showed that $P < 0.05$ was statistically significant.

3. Results

3.1. Perioperative Indicators

The perioperative indicators of the study group were better than those of the

control group ($P < 0.05$), as shown in **Table 2**.

Table 2. Comparison of perioperative indicators between the two groups ($\bar{x} \pm s$).

Group	n	First exhaust time (h)	Time of first ambulation (h)	Hospital stay (d)
Study Group	33	19.96 ± 3.06	14.96 ± 2.07	9.07 ± 2.96
Control Group	33	28.51 ± 4.37	20.09 ± 2.66	14.96 ± 6.06
t		12.747	7.0667	6.466
P		0.000	0.000	0.000

3.2. Complication Rate

The incidence of complications in the study group was lower than that in the control group ($P < 0.05$), as shown in **Table 3**.

Table 3. Comparison of complication rates between the two groups [n, (%)].

Group	n	Pulmonary Infection	Intestinal Obstruction	Intraoperative Hypothermia	Lower Extremity Deep Venous Thrombosis	Incidence Rate
Study Group	33	1	0	0	0	3.03
Control Group	33	2	1	2	1	18.18
χ^2						3.995
P						0.046

3.3. Liver Function Level

There was no significant difference in liver function between the two groups before operation ($P > 0.05$); AST, ALT, and GGT of the study group were lower than those of the control group at 3D after operation ($P < 0.05$), and there was no significant difference in liver function between the groups at 7 d after operation ($P > 0.05$), as shown in **Table 4**.

Table 4. Comparison of liver function before and after operation ($\bar{x} \pm s$).

Group		AST (U/L)	ALT (U/L)	GGT (U/L)
Study Group (n = 33)	Preoperative	57.96 ± 7.07	103.53 ± 27.74	88.64 ± 16.56
	3 days after operation	42.14 ± 6.62 ^{ab}	40.19 ± 5.90 ^{ab}	50.14 ± 8.02 ^{ab}
	7 days after operation	40.26 ± 6.62 ^a	38.49 ± 6.68 ^a	41.12 ± 10.93 ^a
Control Group	Preoperative	57.69 ± 7.10	101.41 ± 29.64	88.94 ± 16.65
	3 days after operation	47.12 ± 6.66 ^a	45.97 ± 6.01 ^a	61.75 ± 6.89 ^a
	7 days after operation	40.52 ± 6.95 ^a	40.14 ± 6.74 ^a	56.68 ± 11.47 ^a

Note: ^a $P < 0.05$ compared with pre-operation in the group; ^b $P < 0.05$ between groups in the same period.

4. Discussion

As the first choice for clinical treatment of liver cancer, the effectiveness of primary liver cancer surgery has been widely recognized. Strengthening rehabilitation nursing during the perioperative period plays a significant role in reducing surgical complications and improving patient prognosis [13] [14]. However, in the process of exploring and practicing the comprehensive nursing model, we have to face up to the limitations of the research, especially the potential bias and the universality of the research results, which are crucial for the comprehensive evaluation and optimization of the nursing model.

This study found that the perioperative indicators of the study group were better than those of the control group, and the incidence of complications was lower than that of the control group ($P < 0.05$), which was consistent with the results of previous studies [15], suggesting that the implementation of hierarchical quantitative management combined with the establishment of sensitive indicators of accelerated rehabilitation nursing in the nursing of patients with liver cancer surgery can further shorten the prognosis time of patients and reduce the incidence of perioperative complications. Cause analysis and nursing-sensitive indicators are important guarantees that reflect the characteristics of nursing work, meet the requirements of nursing quality management, and improve the quality of nursing. The establishment of sensitive clinical nursing indicators provides support for improving the quality of specialized nursing and implementing the content of accelerated rehabilitation nursing at all stages [16]. Some scholars said that accelerating the establishment and application of sensitive indicators of rehabilitation nursing and urging medical staff to apply nursing procedures to provide holistic care for patients would help improve the quality of care and accelerate the prognosis [17]. Hierarchical quantitative management reflects the pertinence of nursing, can give symptomatic nursing intervention to patients according to the nursing needs of different nursing stages, and accelerates postoperative recovery [18] [19]. Hierarchical quantitative management combined with sensitive indicators of accelerated rehabilitation nursing can maximize the pertinence and timeliness of the nursing intervention effect [20], meet the needs of accelerated surgical nursing, and shorten the prognosis of patients. The study found that *ast*, *ALT*, and *GGT* in the study group were lower than those in the control group at 3D after operation ($P < 0.05$). In conclusion, hierarchical quantitative management combined with accelerated rehabilitation indicators can consolidate the curative effect, reduce the incidence of complications, and improve the rehabilitation of liver function. The nursing quality management strategy contributes to the rational allocation of medical resources, improves the quality and efficiency of clinical nursing, shortens the prognosis time, and enhances the rehabilitation effect, which has clinical application value.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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