

Intraoperative Nursing Coordination in Hemostasis Management for Liver Tumor Resection

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Abstract: Objective: To explore the role of nursing coordination in hemostasis management during liver tumor resection. Methods: Eighty-six patients undergoing liver tumor resection between June 2024 and May 2025 were randomly assigned to either a conventional nursing group (n=43) or a nursing coordination group (n=43) and the coordination group (n =43). Conventional nursing and nursing coordination protocols were applied during surgery, respectively. The surgical indicators (operation time, intraoperative blood loss, blood transfusion volume), coagulation function indicators (APTT, PT, FIB), stress hormone levels (NE, Cor), and complication incidence (bleeding, infection, liver failure) were compared between the two groups. Results: The coordination group had significantly shorter operation time, reduced intraoperative blood loss, and lower transfusion volume compared to the conventional group ($P<0.05$). At 24 hours after operation, PT and APTT in the coordination group were lower than those in the conventional group, while FIB and PLT were higher than those in the conventional group, $P<0.05$. The levels of epinephrine and norepinephrine in the coordination group were lower than those in the conventional group at 24 hours after operation $P<0.05$. The complication incidence in the coordination group was lower than that in the conventional group, $P<0.05$. Conclusion: The nursing coordination mode during liver tumor resection has a good implementation effect, which can reduce the operation time, intraoperative blood loss and blood transfusion volume, improve the coagulation function indicators of patients, alleviate the stress response, and reduce complications, which is worthy of promotion.

Keywords: Intraoperative care; Nursing coordination; Liver resection; Hemostasis; Surgical outcomes

Liver tumor is a common clinical serious disease, liver tumor resection is one of the important means of treatment of liver tumor ^[1]. However, the liver has a rich vascular network and unique physiological structure, which makes it prone to hemorrhage during tumor resection ^[2]. Intraoperative bleeding will not only affect the clarity of the surgical field of vision, increase the difficulty of surgical operation, and prolong the operation time, but also may lead to serious complications such as hypovolemic shock and coagulation dysfunction, and even life-threatening. ^[3]. Therefore, effective hemostasis management is the key to the success of liver tumor resection. Traditional surgical nursing is mainly based

on the implementation of medical advice, and each nursing link is relatively independent, lacking systematic coordination and cooperation, so it is difficult to meet the needs of hemostasis management in complex surgery. ^[4]. Nursing coordination emphasizes taking the patient as the center. By optimizing the nursing process, strengthening the communication and cooperation within the nursing team and with surgeons, anesthesiologists and other disciplines, the whole process of operation is dynamically monitored and intervened to provide guarantee for the smooth operation ^[5]. At present, there are relatively few studies on nursing coordination in the management of hemostasis in liver tumor resection. The purpose of this study is to compare the application effect of regular nursing and nursing coordination mode in liver tumor resection, to explore the hemostatic management effect of nursing coordination in the process of liver tumor resection, to provide reference for clinical nursing work, and to improve the safety and effectiveness of liver tumor resection.

1.Data and methods

1.1 General Information

Eighty-six patients with liver tumor resection in our hospital from June 2024 to May 2025 were selected and randomly divided into regular group (n = 43) and coordination group (n =43). regular group: male 25 cases, female 18 cases; age 35-72(54.61±8.36) years old; tumor diameter 3-8(5.13±1.45)cm; tumor type: hepatocellular carcinoma in 29 cases, hepatic hemangioma in 14 cases. Coordination group: 26 males and 17 females; age 35-73(54.66±8.33) years old; tumor diameter 3-8(5.17±1.42)cm; tumor type: 30 cases of hepatocellular carcinoma, 13 cases of hepatic hemangioma. Two groups of general data comparison, $P > 0.05$.

1.2 standard for nano-platoon

Inclusion criteria:(1) by imaging examination and pathological examination confirmed liver tumor;(2) in line with surgical indications;(3) surgery successfully completed;(4) informed consent.

Exclusion criteria:(1) combined with severe heart, lung, kidney and other important organ dysfunction;(2) severe abnormal coagulation function;(3) preoperative has received related treatment affecting coagulation function;(4) blood system diseases;(5) immune dysfunction;(6) pregnant and lactating women;(7) mental illness.

1.3 method

regular group: the implementation of regular nursing mode in operation. Including preoperative to assist patients to complete the examination, a simple preoperative education; intraoperative strict implementation of aseptic operation, with the doctor to complete the transfer of surgical instruments, patient vital signs

monitoring and other basic nursing work; postoperative observation of patient condition changes, in accordance with the doctor's advice for the corresponding nursing operation.

Coordination group: implementation of intraoperative care coordination model. Specific measures are as follows : (1) preoperative nursing coordination: the establishment of the head nurse, the responsibility of nurses, surgeons, anesthesiologists composed of nursing coordination team. The team members jointly assessed the patient's condition, including the patient's physical condition, coagulation function, tumor location and size, etc., and formulated a personalized care plan and hemostasis plan. The responsible nurses strengthen the communication with patients and their families, introduce the operation process, the possible risks and countermeasures in detail, answer the questions of patients and their families, relieve their tension and anxiety, and improve the cooperation degree of patients. At the same time, to assist patients to improve the preoperative examination, to ensure that the examination results are accurate and timely, to provide a reliable basis for the formulation of surgical plans. (2) intraoperative nursing coordination: ① teamwork: during the operation, nursing coordination team members cooperate closely. The itinerant nurse and the anesthesiologist closely monitor the patient's vital signs, such as blood pressure, heart rate, blood oxygen saturation, etc., and report any abnormalities in time, and cooperate with the anesthesiologist to deal with them. Instrument nurses are proficient in surgical procedures and instrument use methods, accurately and quickly transfer surgical instruments, and ensure the continuity of surgical operations. At the same time, maintain good communication with the surgeon, and provide the required hemostatic materials and instruments in time according to the progress of the operation. ② Bleeding monitoring and treatment: The itinerant nurses continued to pay attention to the operation process, and accurately assessed the amount of bleeding during the operation by observing the amount of bleeding in the aspirator bottle and the surgical field of vision. Once the trend of increased bleeding is found, immediately notify the surgeon and quickly provide suitable hemostatic materials, such as gelatin sponge, hemostatic gauze, etc. At the same time, cooperate with the doctor for compression hemostasis, electrocoagulation hemostasis and other operations. For patients with a large amount of bleeding, communicate with the blood transfusion department in time to ensure the timely supply of blood products and maintain the stability of the patient's blood volume. ③ temperature management: hypothermia will affect the patient's coagulation function and increase the risk of bleeding. Intraoperative use of inflatable warming blanket, warming infusion and other measures to maintain the patient's body temperature in the normal range. The itinerant nurses regularly monitor the patient's body temperature and adjust the heating measures in time according to the temperature change. (3) postoperative nursing coordination: after the operation, the patient will be safely sent back to the ward, and the ward nurse to do a detailed handover, including intraoperative blood loss, blood transfusion, operation mode, patient vital signs, etc. The

responsible nurse closely observed the patient's postoperative incision bleeding, drainage fluid color, quantity and nature, if found abnormal timely report to the doctor, and assist in handling. At the same time, according to the recovery of patients, guide patients to carry out reasonable diet and activities, and promote the recovery of patients.

1.4 Observations

(1) Operation indicators: Operation time, intraoperative blood loss, blood transfusion volume.

(2) Coagulation function index: blood was collected before and 24h after operation, and the prothrombin time (PT), activated partial thromboplastin time (APTT), fibrinogen (FIB) and platelet count (PLT) were detected by automatic coagulation analyzer.

(3) Stress hormone levels: blood samples were collected before and 24h after operation, and epinephrine and norepinephrine were detected by enzyme-linked immunosorbent assay.

(4) the incidence of complications: bleeding, infection, liver failure.

1.5 statistical analysis of

Apply SPSS 25.0 software () Express measurement data, OK t inspection;% expression count data, line χ^2 inspection; $P < 0.05$ as the difference was statistically significant.

2 Results

2.1 Comparison of surgical indicators

The operation time, intraoperative blood loss and blood transfusion volume of the coordination group were less than those of the regular group, $P < 0.05$. See **Table 1**.

Table 1. Comparison of operation indexes ($\pm s$)

Group	Number of cases	Operation time (min)	Intraoperative blood loss (ml)	Blood transfusion volume (ml)
regular group	43	156.32 $\pm$ 21.59	850.27 $\pm$ 120.30	450.11 $\pm$ 80.20
Coordination Group	43	132.49 $\pm$ 18.61	622.41 $\pm$ 95.66	280.36 $\pm$ 65.41
t value	-	5.482	9.722	10.756
P value	-	<0.001	<0.001	<0.001

2.2 Coagulation function index comparison of

The coordination group after 24h PT, APTT lower than the regular group, FIB, PLT higher than the regular group, $P < 0.05$. See **Table 2**.

Table 2. Comparison of coagulation function indexes ($\pm s$)

Group	Number of cases	PT(s)		APTT(s)		FIB(g/L)		PLT($\times 10^9$ /L)	
		Preoperative	24h after operation	Preoperative	24h after operation	Preoperative	24h after operation	Preoperative	24h after operation
regular group	43	12.36 $\pm$ 1.26	15.61 $\pm$ 1.55	32.12 $\pm$ 3.21	40.34 $\pm$ 4.30	3.21 $\pm$ 0.43	2.55 $\pm$ 0.36	180.27 $\pm$ 20.32	150.12 $\pm$ 15.48
Coordination Group	43	12.40 $\pm$ 1.21	13.20 $\pm$ 1.12	32.20 $\pm$ 3.43	35.64 $\pm$ 3.51	3.18 $\pm$ 0.57	3.01 $\pm$ 0.44	180.14 $\pm$ 22.47	170.24 $\pm$ 18.51
t value	-	0.150	8.264	0.112	5.552	0.276	5.306	0.028	5.468
P value	-	0.881	<0.001	0.911	<0.001	0.784	<0.001	0.978	<0.001

2.3 Comparison of stress hormone levels

The 24h adrenaline and norepinephrine in the coordination group were lower than those in the regular group, $P < 0.05$. See **Table 3**.

Table 2. Comparison of stress hormone levels ($\pm s$, pg/mL)

Group	Number of cases	Adrenaline		Norepinephrine	
		Preoperative	24h after operation	Preoperative	24h after operation
regular group	43	250.18 $\pm$ 30.25	450.39 $\pm$ 50.41	350.22 $\pm$ 40.32	650.48 $\pm$ 60.56
Coordination Group	43	250.36 $\pm$ 32.47	322.41 $\pm$ 42.26	351.09 $\pm$ 42.59	483.51 $\pm$ 50.61
t value	-	0.027	12.758	0.097	13.873
P value	-	0.979	<0.001	0.923	<0.001

2.4 Comparison of complication rates

The incidence of complications in the coordination group was lower than that in the regular group, $P < 0.05$. See **Table 4**.

Table 4. Comparison of complication rates [n(%)]

Group	Number of cases	Bleeding	Infection	Liver failure	Total incidence
regular group	43	5	4	2	11(25.58)
Coordination Group	43	1	2	1	4(9.30)
χ^2 value	-	-	-	-	3.957
P value	-	-	-	-	0.047

3 Discussion

Liver tumor resection is a high-risk operation, and intraoperative hemostasis management is directly related to the success or failure of the operation and the prognosis of patients. [6]. The liver has a dual blood supply system, where the hepatic artery and portal vein provide abundant blood flow, and the intricate branching of intrahepatic vessels, coupled with the fact that the tumor itself may invade or cause structural deformation of the vessels, significantly increases the risk of bleeding during liver tumor resection [7-8]. Once the intraoperative bleeding is not well controlled, it will not only blur the surgical field of vision, interfere with the surgeon's judgment of the tumor boundary, increase the risk of tumor residue or mistakenly cutting normal liver tissue, but also cause a series of serious problems due to excessive blood loss. [9]. A large amount of blood loss can

lead to a sharp decrease in circulating blood volume, cause hypovolemic shock, and cause insufficient perfusion of important organs, which may lead to dysfunction of heart, brain, kidney and other organs.^[10] At the same time, blood loss and surgical trauma will also activate the body's coagulation system. If the amount of bleeding is large and lasts for a long time, it may consume a large amount of coagulation factors and platelets, causing disseminated intravascular coagulation (DIC), further aggravating the difficulty of hemostasis and forming a vicious circle.^[11-12] In addition, massive intraoperative blood transfusion may also cause many complications, such as transfusion reactions, increased risk of infection, and immunosuppression, which affect the recovery and prognosis of patients after surgery.^[13] Therefore, effective intraoperative hemostasis management is the core link to ensure the smooth progress of liver tumor resection, reduce surgical risk and improve the prognosis of patients. It is necessary to carry out fine management and intervention from various aspects and links^[14].

The nursing coordination model during surgery is a 1 patient-centered nursing model that systematically and dynamically manages the whole process of surgery by integrating the power of the nursing team and multidisciplinary personnel such as surgeons and anesthesiologists^[15]. This model breaks the limitation of relative independence and lack of coordination in traditional nursing, and establishes a closer and more efficient cooperation mechanism.^[16] Multidisciplinary collaboration can fully integrate the knowledge and experience of various specialties, making the nursing plan more comprehensive and scientific, and the hemostasis plan more operable.^[17] The all-round and whole-process nursing coordination mode realizes the precise intervention and whole-process control of hemostasis management in all stages of surgery.^[18]

This study shows that the implementation of nursing coordination model in liver tumor resection can effectively shorten the operation time, reduce the amount of bleeding and blood transfusion. This is mainly due to the close collaboration between the nursing team and the surgeon, anesthesiologist and other disciplines under the nursing coordination model. Before the operation, the nursing coordination team laid the foundation for the smooth operation by comprehensively evaluating the patient's condition and formulating personalized nursing plan and hemostasis plan. During the operation, the itinerant nurses and anesthesiologists closely monitored the vital signs of the patients, found and handled the abnormal situation in time, and ensured the safety of the patients. The instrument nurses skillfully cooperated with the operation operation, accurately transferred the instruments and hemostatic materials, improved the operation efficiency and reduced the bleeding time. At the same time, the monitoring and treatment of intraoperative bleeding are strengthened under the nursing coordination mode, and the bleeding trend can be found in time and effective hemostasis measures can be taken, thereby reducing the amount of intraoperative bleeding.^[19]

Coagulation dysfunction is one of the common complications after liver tumor resection, which increases the risk of bleeding. Studies have shown that 24h

after surgery, coordination group PT, APTT is lower than the regular group, FIB, PLT is higher than the regular group, indicating that the nursing coordination model is helpful to improve the coagulation function of patients after surgery. This may be because the nursing coordination model focuses on intraoperative temperature management, maintains the patient's body temperature in the normal range, and avoids the adverse effects of hypothermia on coagulation function. In addition, timely and effective hemostasis measures can reduce the amount of bleeding during the operation, and avoid the loss and dilution of coagulation factors caused by a large amount of blood loss, which is conducive to maintaining the stability of coagulation function of patients.

Surgical trauma can cause the patient's body to produce stress response, release a large number of stress hormones, such as epinephrine, norepinephrine, etc., these stress hormones will affect the patient's cardiovascular function, immune function, is not conducive to postoperative recovery. In this study, 24h after operation, the level of epinephrine and norepinephrine in the coordination group was lower than that in the regular group, indicating that the nursing coordination model can effectively reduce the stress response of patients. The nursing coordination model relieves the patient's tension and anxiety, and reduces the psychological stress through preoperative psychological care; close monitoring and timely treatment during the operation reduces the stimulation of the patient's body by the surgical trauma, thereby reducing the stress hormone^[20] The release.

The occurrence of complications will prolong the hospitalization time of patients, increase medical costs, and even endanger the lives of patients. This study showed that the coordination group had a lower complication rate than the regular group, further demonstrating the effectiveness of the care coordination model in liver tumor resection. By optimizing hemostasis management, improving coagulation function and reducing stress response, the nursing coordination mode can reduce the occurrence of postoperative bleeding, infection, liver failure and other complications, and promote the postoperative rehabilitation of patients^[21].

Conclusion The operation nursing coordination model in liver tumor resection process in the implementation effect is better, can reduce the operation time, intraoperative blood loss and blood transfusion, improve the patient's coagulation function index, reduce stress response, reduce complications, is worth promoting.

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