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Analysis of the Effects of Preoperative Hepatic Artery Chemoembolization and Quality Nursing Intervention on the Perioperative Safety and Short-term Prognosis of Liver Transplantation in Patients with Hepatocellular Carcinoma

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Abstract: *Objective:* To investigate the effects of preoperative hepatic artery chemoembolization (TACE) and quality nursing interventions on the perioperative safety and short-term prognosis in patients with hepatocellular carcinoma undergoing liver transplantation. *Methods:* The study period spanned from January 2021 to December 2023, and 125 patients with hepatocellular carcinoma admitted to our hospital were selected, all of whom underwent liver transplantation. They were randomly divided into an observation group (n = 63) and a control group (n = 62). The patients in the control group did not undergo TACE before the operation, and the patients in the observation group underwent TACE and quality nursing intervention before the operation. The operation time, intraoperative blood loss, length of hospitalization, liver-free period, complication rate, short-term prognosis, and liver function indexes between the two groups were compared. *Results:* There was no significant difference in operation time, intraoperative blood loss, and length of hospitalization between the two groups ($P < 0.05$). The liver-free period of patients in the observation group was longer than that of the control group ($P < 0.05$). The two groups had no significant difference in the incidence of biliary complications, vascular complications, and postoperative infections ($P > 0.05$). The rate of immune reactive complications in the observation group was lower than that of the control group ($P < 0.05$). There was no significant difference in the perioperative mortality rate, 1-year postoperative survival rate, and 2-year postoperative survival rate ($P > 0.05$). The two groups had no significant difference in postoperative liver function indexes ($P > 0.05$). *Conclusion:* Preoperative TACE and high-quality nursing intervention in patients with hepatocellular carcinoma had no adverse effect on the perioperative safety and short-term prognosis, prolonged the liver-free time, and reduced the incidence of immune-reactive complications.

Keywords: Hepatocellular carcinoma; Liver transplantation; Hepatic artery chemoembolization; Quality nursing intervention

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1. Introduction

Hepatocellular carcinoma is a common clinical malignant tumor that is mainly treated by surgery, where the 5-year survival rate after liver transplantation can reach more than 70%. Hepatic artery chemoembolization (TACE) is an adjuvant treatment option before liver transplantation. However, there is controversy about the effect and some studies have concluded that TACE can increase the incidence of postoperative complications and affect short-term prognosis [1,2]. In this study, a sample of 125 patients with hepatocellular carcinoma who underwent liver transplants was selected to investigate the effects of preoperative TACE on perioperative safety and short-term prognosis.

2. Information and methods

2.1. General information

The Medical Ethics Committee approved this study. The research period spanned from January 2021 to December 2023, and 125 cases of hepatocellular carcinoma patients admitted to our hospital were sampled, all of whom underwent liver transplantation, and were randomly divided into an observation group (n = 63) and a control group (n = 62). There were 38 males and 25 females in the observation group aged 52–68 years old, with an average age of 60.11 ± 3.75 years. The disease duration ranged from 6 months to 2 years, with an average of 1.48 ± 0.33 years. There were 36 males and 26 females in the control group aged 54–69 years old, with an average age of 60.17 ± 3.68 years. The disease duration ranged from 8 months to 2 years, with an average of 1.56 ± 0.38 years. There was no significant difference when comparing the general information of the patients in both groups ($P > 0.05$). Inclusion criteria: (1) Patients diagnosed with hepatocellular carcinoma by pathological diagnosis; (2) meet the indications of liver transplantation; (3) consented. Exclusion criteria: (1) Patients with metastatic hepatocellular carcinoma; (2) patients who underwent liver transplantation for acute liver failure, decompensated cirrhosis, and other lesions; (3) patients who underwent other auxiliary therapeutic programs before surgery.

2.2. Methods

The patients in the control group did not perform TACE before surgery and the physicians properly completed the preoperative preparations, informed the patients of surgical precautions, and performed liver transplantation as scheduled.

The patients in the observation group were scheduled for TACE and quality nursing intervention before surgery. The Seldinger technique was utilized by physicians and the area surrounding the femoral artery was sterilized. A puncture was made in the femoral artery and a catheter was positioned within the artery supplying blood to the tumor. Following this, digital subtraction angiography (DSA) imaging was conducted following established protocols, the tumor's vascular supply was assessed based on imaging results, and chemoembolization procedures were performed. The chemoembolization program used in this study was oxaliplatin (100 mg) and mitomycin (20 mg) combined with super-iodine liquefied oil (5–15 mL). Forty-two cases in the observation group received TACE once before the operation, 15 cases received TACE twice before the operation, and 6 cases received TACE three or more times before the operation. Secondly, quality nursing intervention was performed. Before TACE, nursing staff explained the basic principles of the procedure, operation procedures, methods of cooperation and precautions, and methods of dealing with adverse reactions to the patients, including the advantages of TACE. The nursing staff communicated with the patients to help calm them by introducing successful cases of surgery. The patients were also encouraged to cooperate with the therapeutic interventions. Before the surgery, coagulation tests, liver and kidney function tests, chest X-rays,

electrocardiograms, and allergy tests of contrast agents were conducted. The skin in the groin area was cleaned and prepared 4 hours before the operation and the patient was instructed to fast and refrain from drinking water. The necessary tools were also prepared. During the surgery, the nursing staff cooperated with the physician to complete the puncture procedure, contrast examination, and other operations. The patient's vital signs were closely monitored. After the surgery, the patient's signs were closely monitored. Compression was applied to maintain pressure on the puncture site for 20 minutes to promote hemostasis and secured with a bandage. The punctured limb was extended and immobilized for 6h. The patient was instructed to lie down for the next 24 hours without partaking in strenuous exercises. The blood flow status of the punctured limb was monitored for signs of bleeding, fever, and other adverse reactions. The patients were asked about the degree of pain, where psychological appeasement, drug analgesia, and other pain care interventions were also performed.

2.3 Evaluation criteria

The operation time, intraoperative blood loss, length of hospitalization, and liver-free period of patients in both groups were compared. The incidence of biliary complications, vascular complications, postoperative infections, and immune-reactive complications in both groups were compared. The perioperative mortality rate, 1-year postoperative survival rate, and 2-year postoperative survival rate in both groups were compared. Venous blood samples were collected before and 7d after the operation. The levels of alanine aminotransferase (ALT), aspartate aminotransferase (AST), and total bilirubin (TBIL) were detected by the fully automatic biochemical analyzer.

2.4. Statistical methods

The SPSS 23.0 software was used to analyze the study data. Measurement data were expressed as mean ± standard deviation and the count data were expressed as %. Measurement data were analyzed using a *t*-test, and count data were analyzed using a chi-squared (χ^2) test. Results were considered statistically significant at $P < 0.05$.

3. Results

3.1. Comparison of the operation time, intraoperative blood loss, length of hospitalization, and liver-free period between the two groups

As shown in **Table 1**, there was no significant difference in operation time, intraoperative blood loss, and length of hospitalization between the two groups ($P > 0.05$). The liver-free period of patients in the observation group was longer than that of the control group ($P < 0.05$).

Table 1. Comparison of the operation time, intraoperative blood loss, length of hospitalization time, and liver-free period between the two groups (mean ± standard deviation)

Group	Surgical time (min)	Intraoperative blood loss (mL)	Length of hospitalization (d)	Hepatocellular carcinogenicity (d)
Observation group (n = 63)	402.85 ± 21.38	2698.75 ± 102.45	18.31 ± 2.96	289.44 ± 5.76
Control group (n = 62)	399.76 ± 21.44	2701.36 ± 102.53	18.27 ± 3.05	27.95 ± 3.02
t	0.807	0.142	0.074	317.117
P	0.421	0.887	0.941	0.000

3.2. Comparison of the incidence of complications between the two groups

As shown in **Table 2**, there was no significant difference in the incidence rate of biliary complications, vascular complications, and postoperative infections between both groups ($P > 0.05$). The incidence rate of immune-reactive complications in patients in the observation group was lower than that of the control group ($P < 0.05$).

Table 2. Comparison of complication rates between the two groups [*n* (%)]

Group	Biliary complications	Vascular complications	Postoperative infection	Immune-responsive complications
Observation group ($n = 63$)	3 (4.8)	2 (3.2)	11 (17.5)	0 (0.0)
Control group ($n = 62$)	2 (3.2)	0 (0.0)	8 (12.9)	6 (9.7)
χ^2	0.192	2.000	0.503	6.404
P	0.661	0.157	0.477	0.011

3.3. Comparison of perioperative mortality rate, postoperative 1-year survival rate, and postoperative 2-year survival rate between the two groups

As shown in **Table 3**, there was no significant difference in the perioperative mortality rate, postoperative 1-year survival rate, and postoperative 2-year survival rate between the two groups ($P < 0.05$).

Table 3. Comparison of perioperative mortality, postoperative 1-year survival rate, and postoperative 2-year survival rate between the two groups [*n* (%)]

Groups	Perioperative mortality	The 1-year postoperative survival rate	The 2-year postoperative survival rate
Observation group ($n = 63$)	3 (4.8)	57 (90.5)	53 (84.1)
Control group ($n = 62$)	4 (6.5)	55 (88.7)	50 (80.6)
χ^2	0.168	0.104	0.261
P	0.681	0.746	0.609

3.4. Comparison of liver function indexes between the two groups

As shown in **Table 4**, there was no significant difference in the postoperative liver function indexes between the two groups ($P > 0.05$).

Table 4. Comparison of liver function indexes between the two groups (mean ± standard deviation)

Groups	ALT (IU/L)		AST (IU/L)		TBIL (mg/dl)	
	Preoperative	Postoperative	Preoperative	Postoperative	Preoperative	Postoperative
Observation group ($n = 63$)	35.18 ± 4.96	105.24 ± 9.94	22.64 ± 2.17	58.96 ± 6.79	42.11 ± 3.85	55.27 ± 5.94
Control group ($n = 62$)	35.26 ± 5.01	105.17 ± 9.85	22.59 ± 2.24	59.02 ± 6.84	42.07 ± 3.96	55.35 ± 6.04
t	0.090	0.040	0.127	0.049	0.057	0.075
P	0.929	0.969	0.899	0.961	0.954	0.941

4. Discussion

Clinical studies have shown that liver transplantation is the best solution to improve the long-term survival rate of patients with hepatocellular carcinoma. To ensure the surgical effect, physicians need to accurately assess the patient's condition and adopt appropriate surgical disposition solutions to ensure that the patient's condition is effectively controlled [3,4].

TACE is a preoperative treatment for liver transplantation. Some studies have concluded that it can induce hypoxic necrosis of tumor cells, resulting in adhesions between the tumor in the superficial region of the liver and the gallbladder, gastrointestinal tract, diaphragm, and other peripheral tissues, which leads to prolonged adhesion detachment, increased surgical bleeding, and multiple intubations during the operation. These can easily lead to vascular complications and cause ischemic stenosis of the biliary tract [5]. The latest clinical research concluded that during TACE treatment, chemotherapeutic drugs can directly kill tumor cells together, with the blockage of the hepatic artery preemptively blocking the blood flow to the liver, which in turn reduces the difficulty of liver transplantation surgery. Hence, physicians can complete the secretion of adhesions between the liver and the surrounding tissues in a short period. Most patients only receive TACE once before the operation to avoid the vascular complications caused by repeated intubation [6]. During TACE treatment, a quality nursing intervention program is adopted to enhance the patient's awareness of the operation, improve their physical and mental state, and promptly dispose of abnormal conditions, thus ensuring the safety and effectiveness of the operation.

This study confirmed no significant difference in the operation time, intraoperative blood loss, and length of hospitalization between the two groups ($P > 0.05$). The liver-free period of patients in the observation group was longer than that of the control group ($P < 0.05$). There was no significant difference in the incidence rate of biliary complications, vascular complications, and postoperative infections between the two groups ($P > 0.05$), suggesting that preoperative TACE in patients with hepatocellular carcinoma did not affect the operation time, length of hospitalization time, and intraoperative blood loss, and can prolong the liver-free period with a lower complication rate. We can see that the operation time and intraoperative blood loss are the main factors affecting the efficacy of liver transplantation. Under the conventional surgical mode, the physician chooses the appropriate time to restrict the blood flow to the liver during the operation, and the difficulty of surgical operation is high. During preoperative TACE, physicians prioritize the blockage of hepatic blood flow, which can reduce the difficulty of surgical operation and the amount of blood loss during adhesion secretion. Most of the patients in the observation group only received TACE for one time to avoid damage to the vessel wall caused by multiple intubations. Hepatic artery embolization can be accurately completed, which can alleviate the impact of TACE on the perioperative safety of liver transplantation [7]. In addition, chemotherapeutic drugs directly act on tumor cells during TACE treatment, which can control the progression of the disease and prolong the liver-free period. The incidence of immune reactive complications in patients in the observation group was lower than that in the control group ($P < 0.05$), suggesting that preoperative TACE in patients with hepatocellular carcinoma can significantly reduce the incidence of immune reactive complications. This is because conventional liver transplantation has no regulatory effect on the body's immune function. The application of a hefty dose of chemotherapeutic drugs at the initial stage of TACE treatment can damage the liver tissues and aggravate the state of immune suppression. TACE can directly act on tumor cells, and along with the prolongation of the treatment time, it can significantly reduce the tumor load. It can reduce the tumor cells' secretion of immunosuppressive factor level to gradually restore the patient's immune function and reduce the incidence of immune complications [8]. In this study, there was no significant difference in the postoperative liver function indexes and short-term prognostic indexes between the two groups ($P > 0.05$),

suggesting that preoperative TACE had no adverse effect on short-term prognosis. Hepatic artery embolization can be accomplished by precise and effective preoperative TACE operation to kill tumor cells, with a lower complication rate and no adverse effect on short-term prognosis.

5. Conclusion

Preoperative TACE and high-quality nursing intervention in patients with hepatocellular carcinoma had no adverse effect on perioperative safety and short-term prognosis. It prolonged the liver-free time, reduced the incidence of immune-responsive complications, and is worthy of popularization.

Disclosure statement

The authors declare no conflict of interest.

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