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ORIGINAL ARTICLE

Retrospective Study

Improving rehabilitation and quality of life after percutaneous transhepatic cholangiography drainage with a rapid rehabilitation model

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Author contributions: Xia LL and Su T designed the experiment; Li Y drafted the work; Mao JF and Zhang QH collected the data; Liu YY and Xia LL analyzed and interpreted data; Xia LL and Liu YY wrote the article.

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Abstract

BACKGROUND

Percutaneous transhepatic cholangiography drainage (PTCD) effectively treats biliary obstruction. However, patients must maintain the drainage tube after hospital discharge, which may interfere with daily life and work, potentially causing psychological distress. Postoperative rehabilitation is crucial, and strengthened nursing interventions can shorten recovery time.

AIM

The aim was to evaluate an inpatient model to shorten rehabilitation duration and improve quality of life after PTCD.

METHODS

A total of 118 patients with malignant obstructive jaundice who were admitted to our hospital between May 2018 and January 2021 were included and divided into observational (with therapy) and control (no therapy) groups of 59 each.

RESULTS

The observational group had fewer hospitalization days than the control group. The complication, the PTCD fixed-tube prolapse, and tube-related admission rates

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within 3 mo after PTCD were significantly lower in the observation group than in the control group ($P < 0.05$). The fatigue, pain, nausea, vomiting, pruritus, emaciation, and fever scores after PTCD decreased in both groups compared with the scores before PTCD ($P < 0.05$). The quality of life scores after the intervention were higher in the observation than in the control group ($P < 0.05$).

CONCLUSION
The model promoted rehabilitation after PTCD, reduced post-PTCD complications, and the tube-related admissions in the 3 mo after the procedure, and improved the quality of life.

Key Words: Rapid rehabilitation model; Percutaneous transhepatic cholangiography drainage; Quality of life; Complications

Core Tip: This retrospective study found that a rapid recovery model promoted the recovery of patients after percutaneous transhepatic cholangiography drainage intervention, reduced intervention-related complications and catheter-related admissions within 3 mo of intervention, and improved quality of life.

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INTRODUCTION

Malignant obstructive jaundice is a form of biliary obstructive jaundice caused by malignant tumors[1,2]. Patients often have potentially fatal, severe complications, such as malnutrition and immune dysfunction[3]. Further, patients are often in an advanced disease stage, commonly secondary to infections and liver failure, making surgery more difficult. Therefore, patients with malignant obstructive jaundice require timely and effective treatment to protect liver function, improve immune function, and enhance resistance. Percutaneous transhepatic biliary drainage (PTCD) is a safe and effective method for palliative malignant obstructive jaundice treatment[4]. PTCD reduces the severity of jaundice, alleviates biliary obstruction, improves the quality of life, and prolongs patient survival[5]. After PTCD treatment, patients must maintain the drainage tube outside of the hospital for a sustained period, which may cause significant disruption of their daily life and work, potentially causing psychological disorders.

Postoperative rehabilitation is important for patients with trauma and strengthening nursing measures can improve the speed of recovery[6]. Thus, the comprehensive treatment and nursing protocols implemented in the rapid rehabilitation nursing model have been well-received by most patients. The model reduces rehabilitation time, the complication rate, and patient pain and psychological distress[7,8]. This study retrospectively assessed the rapid rehabilitation model after PTCD for patients with malignant obstructive jaundice to determine any rehabilitation or quality of life improvements and provide a reference clinical treatment.

MATERIALS AND METHODS

Patients

Patients with malignant obstructive jaundice treated with PTCD at our hospital between May 2018 and January 2021 were retrospectively analyzed. The inclusion criteria were (1) meeting the criteria for malignant obstructive jaundice[9,10] (*i.e.*

distinct symptoms and signs related to obstructive jaundice, such as jaundice, abdominal pain, and fever, or symptoms accompanied by abdominal distension, fatigue, and anorexia; significantly increased indicators of liver dysfunction or abnormal tumor markers; a B-ultrasound-, computed tomography- and magnetic resonance cholangiopancreatography-confirmed malignant lesion, and pathologically confirmed biliary obstruction caused by the malignant tumor); (2) ≥ 18 years and ≤ 75 years of age; (3) having tumors above tumor node metastasis stage T3 with no possibility of surgical treatment; (4) treatment with PTCD; and (5) availability of complete clinical data. Patients with (1) cardiopulmonary dysfunction; (2) jaundice caused by other factors; (3) a Canovschi overall health score of < 70; (4) mental illness or psychological disease; and (5) a history of biliary tract surgery or radical surgery were excluded. The patients were divided into routine intervention (the control group) and rapid rehabilitation intervention (the observation group).

Surgical methods

The location of the obstruction was identified by preoperative imaging. Intercostal spaces 8-10 in the right axillary midline were selected as a puncture point for patients with common bile duct and right hepatic duct obstruction. The puncture point was under the xiphoid process for patients with left hepatic duct obstruction. Routine disinfection and draping were performed with the patient in the supine position, and local anesthesia was administered using 2% lidocaine. The needle was inserted layer by layer using X-ray fluoroscopy to avoid large blood vessels as much as possible. After the puncture needle entered the dilated bile duct, the needle core was removed and bile was withdrawn. Iohexol was injected for comparative imaging to identify the internal and external bile ducts and liver obstruction sites. A guidewire was inserted, and a decision regarding balloon dilatation was made based on the occlusion. A drainage tube or biliary stent was placed along the guidewire. After confirming that the drainage tube and stent were in a good position and barrier-free, they were reimaged, and the drainage tube was externally fixed and connected to a drainage bag.

Therapeutic methods

The control group received routine intervention with preoperative preparation and intraoperative monitoring. The patients also received standard postoperative education and were provided with discharge guidance. The observation group received the rapid rehabilitation model intervention, comprising preoperative health education, psychological care, and preoperative preparation guidelines. Health education included informing patients about the disease, treatment plan, and postoperative prevention measures. Psychological care provided counseling based on the patient's condition and was intended to improve their mood and treatment compliance. Regarding preoperative preparation, the dietary requirements were explained, and supervision was initiated to ensure fasting and hydration status at prescribed times. However, situational consideration for each patient meant that some were allowed an appropriate amount of glucose saline. Intraoperative care required patients to actively cooperate with the attending doctor and consult with the nursing staff. Appropriate intraoperative methods reduced patient tension and anxiety, allowing for better cooperation. Postoperative basic care, activity, and dietary care were also performed. Basic postoperative nursing care included routine fluid replacement, monitoring vital signs, lying on the back for 6 h, based on clinical symptoms, biochemical indicators, and postoperative cholangiography, and monitoring the blood, liver function, and electrolytes 1 to 3 d after the operation. Patients were advised about analgesia, pain score, and avoiding infection and complications related to use of the analgesic pump installed during the operation. Personalized rehabilitation plans were created situationally based on patient limb and joint movements, dietary requirements, and formulated with attention to the appropriate limb-joint movement times. For example, some patients could drink water appropriately 4 h after surgery and eat food about 12 h later to promote intestinal function recovery. After discharge, the caregiver informed the patient of precautions and requirements.

Patient data

The length of hospital stay and complications, including hemorrhage, pancreatitis, biliary infection, and stent occlusion, were recorded for all patients. The emergence of PTCD tube fixation was classified as no emergence, partial emergence (catheter shift ≤ 1 cm), and complete emergence (catheter shift > 1 cm). Catheter prolapse included partial and complete prolapse. A hospital-made questionnaire was used to assign a

PTCD catheter mastery score to assess patient knowledge of PTCD, including catheter care, observation, and prevention of complications, observation of drainage fluid, and observation and care of wounds. Scores ranged from 0 to 10 points for a single aspect, with 0 points indicating non-mastery and 10 points indicating proficiency. Malignant obstructive jaundice-specific quality of life was assessed using a scoring system that included fatigue, pain, nausea and vomiting, itching, weight loss, and fever. The higher the score, the lower the quality of life.

Test method

Fasting venous blood (3–5 mL) was collected from the antecubital area in the morning and centrifuged at 3000 r/min for about 10 min to obtain the serum. A quantitative analyzer (QR-1000; Shenzhen Huisong Technology Development Co., Ltd., Shenzhen, China) to assay C-reactive protein (CRP, normal range, 0 to 10 mg/L). An automated hematology analyzer (LH750, Beckman Coulter, Brea, CA, USA) was used to determine leukocyte counts (normal range, 4.0×10^9/L to 10.0×10^9/L). A Cobas C310 automated biochemical analyzer (Roche, Switzerland) was used to test liver function indicators [*e.g.*, total bilirubin (TBIL), alkaline phosphatase (ALP), total bile acids (TBAs), and alanine aminotransferase (ALT)] before and after treatment.

Statistical analysis

SPSS version 19.0 (IBM Corp., Armonk, NY, United States) was used for the statistical analysis. Results were reported as means ± SD. Independent sample *t*-tests were used for intergroup comparisons, and paired *t*-tests were used for intragroup comparisons. χ^2 tests was used for rate comparisons. *P* values of < 0.05 indicated statistical significance.

RESULTS

Demographic information

In total, 118 patients with malignant obstructive jaundice were treated with PTCD in our hospital between May 2018 and January 2021; 66 were men, and 52 were women, and their average age was 63.85 ± 8.05 years. The routine intervention and rapid rehabilitation intervention groups each included 59 patients. General demographic data, sex, location of the obstruction, disease type, and educational background, did not differ between the groups ($P > 0.05$; Table 1).

Hospital stay and the pipeline-related hospitalization within 3 mo after PTCD

The observation group had fewer hospitalization days than the control group. In addition, the pipeline-related admission rate within 3 mo after PTCD was significantly lower in the observation group than in the control group ($P < 0.05$; Table 2).

ALP, ALT, TBIL, and TBA

ALP, ALT, TBIL, and TBA did not differ between the groups before PTCD ($P > 0.05$). In both groups, all four significantly decreased after PTCD compared with before PTCD ($P < 0.05$). After PTCD, all factors were significantly lower in the observation group than in the control group ($P < 0.05$; Table 3).

White blood cell count and CRP level

White blood cell (WBC) count and CRP level did not differ between the groups before PTCD ($P > 0.05$) but they significantly had decreased in both groups after PTCD ($P < 0.05$). After PTCD, both factors were lower in the observation group than in the control group ($P < 0.05$; Table 4).

PTCD fixed-tube prolapse and complication rates

The PTCD fixed-tube prolapse rate and the complication rate were both significantly lower in the observation group than in the control group ($P < 0.05$; Tables 5 and 6).

PTCD band-catheter mastery scores

Before PTCD, the PTCD cannulation mastery scores (*i.e.* PTCD proficiency) did not differ between the groups ($P > 0.05$). However, the scores for PTCD cannulation nursing care, observing and preventing complications, observing drainage liquid, and observing and caring for wounds significantly increased compared with the scores before PTCD in both groups ($P < 0.05$). The scores were higher in the observation

Table 1 Demographic characteristics, *n* (%)

Parameters	Control group (*n* = 59)	Observation group (*n* = 59)
Sex		
Male	34 (57.63)	32 (54.24)
Female	25 (42.37)	27 (45.76)
Age (yr)	62.95 ± 9.02	62.01 ± 9.75
Obstruction site		
Low	37 (62.71)	31 (52.54)
High position	22 (37.29)	28 (47.46)
Disease type		
Hilar cholangiocarcinoma	33 (55.93)	30 (50.08)
Middle-lower cholangiocarcinoma	14 (23.73)	15 (25.42)
Pancreatic Head Cancer	4 (6.78)	8 (13.56)
Ampullary carcinoma	8 (13.56)	6 (16.95)
Education		
Junior high school and below	8 (13.56)	10 (16.95)
Technical secondary school and high school	19 (32.30)	17 (28.81)
College degree and above	32 (54.24)	32 (54.24)
Medical insurance		
Medical insurance	31 (52.54)	27 (45.76)
Business insurance	16 (27.12)	17 (28.81)
Own expense	12 (20.34)	15 (25.42)

Table 2 Hospitalization after percutaneous transhepatic cholangiography drainage

Group	No. of days	Pipeline-related admissions[c]
Control	15.23 ± 3.02	8 (13.56)
Observation	13.12 ± 2.15[a]	1 (1.69)[a]

[a]$P < 0.05$ *vs* control group.
[c]$P < 0.05$ *vs* control 3 mo after surgery.
Data are *n* (%) or mean ± SD.

group after PTCD than in the control group ($P < 0.05$; Table 7).

Quality of life

Before PTCD, the quality of life scores did not differ between the groups ($P > 0.05$). After PTCD, fatigue, pain, nausea, vomiting, pruritus, emaciation, and fever scores had decreased in both groups ($P < 0.05$). The quality of life scores were significantly higher after PTCD in the observation group than in the control group ($P < 0.05$; Table 8).

DISCUSSION

The PTCD procedure is minimally traumatic, relatively convenient, widely applicable, and especially suitable for patients in poor condition, patients who cannot tolerate general anesthesia, and patients with a history of previous gastrointestinal surgery and deformities. However, PTCD has disadvantages. The tube is used for a long time and requires maintenance after hospital discharge. Therefore, patients may suffer from

Table 3 Alkaline phosphatase, alanine aminotransferase, total bilirubin, and total bile acid before and after percutaneous transhepatic cholangiography drainage (mean ± SD)

Group	ALP (U/L)		ALT (U/L)		TBIL (μmol/L)		TBA (U/L)	
	Before	After	Before	After	Before	After	Before	After
Control	405.63 ± 53.69	195.89 ± 23.16[a]	121.36 ± 29.12	49.23 ± 6.02[a]	212.03 ± 41.26	113.30 ± 24.03[a]	115.23 ± 15.86	28.23 ± 8.12[a]
Observation	412.05 ± 48.76	184.25 ± 18.44[a,c]	123.63 ± 25.78	42.02 ± 5.69[a,c]	204.96 ± 42.84	104.89 ± 16.45[a,c]	113.86 ± 19.14	10.26 ± 2.47[a,c]

[a]$P < 0.05$ *vs* pre-intervention.
[c]$P < 0.05$ *vs* control group.
ALP: Alkaline phosphatase; ALT: Alanine aminotransferase; TBA: Total bile acid; TBIL: Total bilirubin.

Table 4 White blood cell count and C-reactive protein before and after percutaneous transhepatic cholangiography drainage (mean ± SD)

Group	WBC (× 10^9/L)		CRP (mg/L)	
	Before	After	Before	After
Control	14.69 ± 2.15	8.45 ± 1.03[a]	49.63 ± 5.23	23.03 ± 4.11[a]
Observation	14.71 ± 2.32	7.91 ± 0.89[a,c]	50.01 ± 5.41	17.56 ± 2.53[a,c]

[a]$P < 0.05$ *vs* before percutaneous transhepatic cholangiography drainage.
[c]$P < 0.05$ *vs* control group.
CRP: C-reactive protein; WBC: White blood cells.

Table 5 Percutaneous transhepatic cholangiography drainage prolapse, *n* (%)

Group	None	Partial	Complete	Escape rate
Control	48 (81.36)	8 (13.56)	3 (5.08)	11 (18.64)
Observation	57 (96.61)	2 (3.39)	0 (0.00)	2 (3.39)[a]

[a]$P < 0.05$ *vs* control group.

Table 6 Complications after percutaneous transhepatic cholangiography drainage, *n* (%)

Group	Bleeding	Pancreatitis	Biliary tract	Blocked stent infection	Total
Control	3 (5.08)	1 (1.69)	4 (6.78)	2 (3.39)	10 (16.95)
Observation	1 (1.69)	0 (0.00)	2 (3.39)	0 (0.00)	3 (5.08)[a]

[a]$P < 0.05$ *vs* control group.

postoperative complications, such as hemophilia, bile leakage, bacterial retrograde infection, and stent blockage[11-13]. A targeted nursing intervention model is thus necessary to ensure a successful operation and proper tube use. The rapid rehabilitation nursing model was implemented at our hospital for postoperative care of patients and to provide health guidance so that patients have a better understanding of the nursing and rehabilitation processes. Further, psychological and dietary care can aid patient recovery. At the same time, regular ward rounds by nursing staff can improve the understanding of each patient's status, allowing for shortcomings in nursing care to be identified and improved upon, aiding comprehensive and rapid rehabilitation, and reducing recovery time[14,15].

There were significantly fewer hospitalization days and a lower tube-related admission rate within 3 mo after PTCD in the observation group than in the control group. The rapid rehabilitation nursing model also improved the understanding and mastery of PTCD catheter-related knowledge, reducing complications, and the

Table 7 Tube-related knowledge mastery scores before and after percutaneous transhepatic cholangiography drainage (mean ± SD)

Group	PTCD tube care		Complications		Drainage fluid		Wound care	
	Before	After	Before	After	Before	After	Before	After
Control	5.15 ± 0.54	7.23 ± 0.46[c]	4.85 ± 0.39	7.14 ± 0.55[c]	5.03 ± 0.41	7.25 ± 0.45[c]	5.63 ± 0.41	7.74 ± 0.46[c]
Observation	5.06 ± 0.61	8.72 ± 0.51[a,c]	4.82 ± 0.45	8.83 ± 0.57[a,c]	5.10 ± 0.38	8.57 ± 0.43[a,c]	5.58 ± 0.46	9.14 ± 0.41[a,c]

[a]$P < 0.05$ *vs* before percutaneous transhepatic cholangiography drainage.
[c]$P < 0.05$ *vs* control group.
PTCD: Percutaneous transhepatic cholangiography drainage.

Table 8 Quality of life scores before and after percutaneous transhepatic cholangiography drainage (mean ± SD, min)

Parameter	Control group		Observation group	
	Before	After	Before	After
Fatigue	78.23 ± 8.69	32.63 ± 5.36	77.96 ± 10.03	23.05 ± 4.96
Pain	66.23 ± 9.65	35.26 ± 4.85	65.96 ± 10.02	19.36 ± 5.02
Nausea and vomiting	68.77 ± 10.45	30.36 ± 4.12	69.02 ± 9.52	18.26 ± 3.69
Itching	65.32 ± 9.21	22.05 ± 8.14	64.53 ± 10.23	14.26 ± 4.12
Emaciation	62.55 ± 4.85	41.05 ± 3.86	62.85 ± 5.17	32.63 ± 4.02
Fever	58.69 ± 8.96	27.41 ± 6.11	59.04 ± 9.41	22.03 ± 4.01

catheter-related readmission rate. This analysis was motivated by the fact that routine discharge guidelines require patients to passively master the relevant postoperative care requirements, and previous experience indicated that the specific post-discharge procedures were not fully grasped, and there were usually many uncertainties. However, the rapid rehabilitation nursing mode adopted in the observation group provided patients and their families with planned preoperative and postoperative guidance from specialists and full-time nurses to enhance their level of knowledge related to PTCD. Patients could also freely ask questions to attempt to master the related nursing knowledge until they were confident. Thus, the extent of patient knowledge related to the disease improved. Further, during the perioperative nursing intervention, medical and nurse specialists paid close attention to the patient's psychological status over time, provided psychological comfort and emotional support, and promoted rehabilitation.

CRP is an acute-phase reaction protein. When the body is attacked by viruses, pathogenic bacteria, or other substances, the serum CRP content significantly increases. For example, a significant increase in CRP levels can be detected within hours after the onset of a bacterial blood infection[16]. A WBC count is a primary component of a routine blood examination and also an important indicator of acute infectious diseases. When acute severe inflammation, acute suppurative inflammation, bacterial infection, and severe tissue damage occur, WBC changes are significant[17, 18]. In this study, the WBC count and CRP levels significantly decreased in both groups after PTCD compared with before PTCD, and were lower in the observation group than in the control group after PTCD. The results indicate that postoperative infection can be reduced by reasonable nursing methods. ALP, ALT, TBIL, and TBA also decreased in both groups after PTCD compared with before PTCD, and were lower in the observation group than in the control group after PTCD. The results suggest that both postoperative nursing interventions effectively reduced yellowing and liver damage, but the rapid rehabilitation nursing model was more effective in improving liver function. Evaluation of the perioperative nursing process demonstrated that the nursing staff closely observed the patient's vital signs, provided timely treatment in abnormal situations, ensured smooth progress of the operation, and improved the overall quality and effectiveness of care. As such, patients with a high degree of cooperation and quality of care had a reduced occurrence of postoperative infections.

The prolapse and PTCD fixation-tube complication rates in the observation group were significantly lower than in the control group. Catheter removal and occlusion were the most common complications in patients after PTCD despite both groups receiving discharge guidance. However, appropriate guidance was not provided to patients in the control group, and was subsequently forgotten. Patients in the observation group maintained a long-term grasp of the relevant knowledge, and when patients had doubts regarding catheter placement, they were resolved through out-of-hospital follow-up, greatly reducing the incidence of complications. In the rapid rehabilitation model, the nursing staff strengthened the disease-related guidance to facilitate patients' long-term memory and improve their understanding of the information. The mastery scores of PTCD tube care, observing and preventing complications, observing drainage fluid, and observing and caring for wounds increased in both groups after compared with before PTCD. However, the quality of life scores for fatigue, pain, nausea, vomiting, pruritus, emaciation, and fever decreased in both groups. The mastery scores for PTCD tube knowledge after PTCD were higher in the observation group than in the control group, as were the quality of life scores, indicating that the nursing staff comforted and fully informed the patients. Further, they thoroughly understood the patients' emotions, consequently reducing negative feelings that helped to improve PTCD treatment preparation.

Postoperatively, nurses should closely observe patients' vital signs and the drainage fluid properties, fix the drainage tube, maintain effective drainage, and give extra care to catheter removal, while also improving their awareness and care for complications, such as bile leakage and hemorrhage. In nursing, the patients are holistically treated, with emphasis on patient-centered and personalized care, while ensuring the continuity and quality of overall care, thereby improving patient quality of life after surgery[19,20].

Presently, there are many nursing interventions for patients after PTCD procedures, and a unified nursing method has not been adopted. This innovative study applied the rapid recovery model to perioperative patient care after PTCD to improve therapeutic efficacy and safety and reduce complications. However, the study was limited by the small sample size. Further studies with more participants could further support the conclusions.

CONCLUSION

The rapid rehabilitation model promoted the rehabilitation of patients after PTCD, reduced postoperative complications, reduced tube-related admission rate within 3 mo after PTCD, and improved patient quality of life.

ARTICLE HIGHLIGHTS

Research background

Percutaneous transhepatic cholangiography and drainage (PTCD) is an effective way to treat biliary obstruction. However, patients need to keep the drainage tube after they are discharged from the hospital. Enhanced nursing measures can increase the speed of recovery.

Research motivation

The motivation was to improve the recovery of patients after percutaneous transhepatic cholangiography drainage.

Research objectives

The study aimed to evaluate a rapid inpatient rehabilitation model to improve care, rehabilitation time, and patient quality of life after PTCD.

Research methods

A group study was conducted in 118 patients with malignant obstructive jaundice admitted to our hospital between May 2018 and January 2021.

Research results

The length of stay was shorter and the overall recovery level was better in the

observation group than that of the control group.

Research conclusions

The rapid rehabilitation model promoted rehabilitation after PTCD, reduced post-PTCD complications, and reduced the tube-related admission rate within 3 mo after PTCD, and improved patient quality of life.

Research perspectives

The rapid recovery model improved recovery after PTCD, improved the patient quality of life, and potentially has broad clinical application.

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