

ORIGINAL RESEARCH

Observation on the effect of sequential psychological intervention combined with body position management in patients with primary liver cancer undergoing hepatic arterial infusion chemotherapy

Weiwei Zhao¹, Huiqian Yu¹, Lingxue Fu¹, Yiyang Wang^{1,*}

¹Department of Interventional Therapy,
The Second Affiliated Hospital of
Wenzhou Medical University, 325000
Wenzhou, Zhejiang, China

***Correspondence**
yywang7252@163.com
(Yiyang Wang)

Abstract

This study aims to observe the effect of sequential psychological intervention combined with body position management on patients diagnosed with primary liver cancer undergoing hepatic arterial infusion chemotherapy (HAIC). A cohort of 108 male patients diagnosed with primary hepatocellular carcinoma, undergoing HAIC at the Department of Oncology in our hospital between February 2022 and January 2024, were retrospectively selected. Patients admitted between February 2022 and January 2023 were included in the control group, while patients admitted between February 2023 and January 2024 were included in the observation group. The control group was treated with routine care, and the observation group received sequential psychological intervention combined with body position management. We compared their psychological status, perceived stress levels, incidence of adverse reactions, and overall comfort levels between the two groups before and after nursing interventions. After nursing interventions, the scores across all dimensions of the Depression Anxiety and Stress Scale (DASS-21) were lower in both the intervention and control groups compared to baseline, with the observation group demonstrating significantly lower scores in the perceived stress scale ((12.11 ± 3.20) points) compared to the control group ((17.12 ± 3.39) points) ($p < 0.001$). Furthermore, there were statistically significant differences observed in the incidence of adverse reactions and comfort between the two groups ($p < 0.001$). Sequential psychological intervention combined with body position management demonstrated superior nursing efficacy for male patients undergoing HAIC for primary liver cancer, effectively enhanced psychological well-being, mitigated perceived stress and reduced the occurrence of adverse reactions.

Keywords

Sequential psychological care; Body position management; Hepatic arterial infusion chemotherapy; Psychological status

1. Introduction

Primary liver cancer is recognized as one of the most prevalent malignant liver tumors worldwide, with its incidence and mortality rates steadily rising [1]. Hepatic arterial infusion chemotherapy (HAIC) is an interventional therapy that infuses chemotherapeutic drugs through the hepatic artery to increase the concentration of drugs in liver tumors, improve anti-tumor effects and maximize the killing of tumor cells [2]. However, due to local continuous perfusion of high-dose chemotherapeutic drugs, combined with long perfusion time, the toxicity of chemotherapeutic drugs to the body cannot be ignored. Therefore, patients undergoing HAIC often encounter not only physical challenges but also psychological distress and a decline in quality of life [3]. To enhance comprehensive patient

care during HAIC, researchers have started to investigate the integration of sequential psychological intervention and body position management [4].

Sequential psychological intervention aims to provide patients with effective coping strategies to manage psychological distress throughout treatment, employing a multi-stage and systematic approach to psychological support [5, 6]. Through continuous attention to the psychological status of patients, providing professional support and help, we take corresponding psychological intervention measures to help patients cope with the psychological distress and pressure caused by the disease and promote the recovery of their physical and mental health. Conversely, body position management assumes a crucial role in optimizing therapeutic outcomes and minimizing patient discomfort during surgical procedures and hospitaliza-

tion. Additionally, it relieves discomfort and pain, improve comfort and promote mental health [7]. Sequential psychological intervention has demonstrated broad applicability in chemotherapy contexts, including cervical and breast cancer treatment.

Herein, this study aims to improve patients' psychological well-being, reduce the incidence of stressors and adverse events, and enhance overall patient comfort. These findings contribute to the theoretical framework supporting the clinical implementation of sequential psychological intervention integrated with body position management.

2. Materials and methods

2.1 Study subjects

A total of 108 male patients with primary liver cancer who underwent HAIC in the Department of Oncology of our hospital from February 2022 to January 2024 were retrospectively selected. The patients admitted between February 2022 and January 2023 were included in the control group, while the patients admitted between February 2023 and January 2024 were included in the observation group, the control group was treated with routine care, and the observation group received sequential psychological intervention combined with body position management. In the control group, there were 7 cases of undifferentiated, 20 cases of poorly differentiated and 27 cases of moderately differentiated patients. In the observation group, there were 8 cases of undifferentiated, 19 cases of poorly differentiated and 28 cases of moderately differentiated patients. Routine nursing care was administered to the control group, while sequential psychological intervention combined with body position management was provided to the observation group.

The study inclusion criteria comprised the following: ① patients who met the relevant diagnostic criteria in the Guidelines for the Standardized Pathological Diagnosis of Primary Liver Cancer (2015 Edition) [8] and confirmed by pathological diagnosis; ② aged 18–75 years old; ③ their first HAIC was performed at our hospital, and the operation was performed by the same group of physicians; and ④ had normal cognitive function and consciousness, with normal basic reading and writing ability, hearing, vision and communication ability. Moreover, the study exclusion criteria included patients with ① combined with immune system diseases or coagulopathy; ② other types of malignant tumors; ③ pregnancy or lactation; ④ mental disorders; and ⑤ kidney, heart, brain, spleen and other important organ dysfunction. Patients in both groups signed the informed consent forms.

The two groups demonstrated comparability in terms of gender, age, lesion orientation and education level, with no significant differences observed ($p > 0.05$). The results are presented in Table 1.

2.2 Study methods

2.2.1 Study methods for the control group

The control group received standardized care procedures as follows: ① Preoperative education: Patients received detailed explanations of the surgical procedures associated with HAIC,

including discussions on potential risks and expected outcomes. This educational initiative aimed to enhance patients' understanding and cooperation. ② Preoperative preparation: Prior to surgery, patients underwent comprehensive evaluations, including monitoring of vital signs, laboratory examinations and electrocardiography (ECG) assessments to assess surgical risk. ③ Perioperative routine care of HAIC: Standardized perioperative care for HAIC was provided, encompassing tasks such as establishing venous access, positioning patients correctly and administering appropriate analgesia and antibiotics. ④ Observation of HAIC-Related Adverse Reactions: Postoperatively, patients were closely monitored for adverse reactions associated with HAIC, including symptoms such as nausea, vomiting and abdominal pain. Monitoring of blood routine, liver function, coagulation function and other relevant indicators was conducted, as well as regular assessments of patients' pain levels. ⑤ Active management: Proactive and effective nursing interventions were implemented to address any identified issues. This included adjusting drug treatments as necessary and providing tailored supportive care to ensure patients received optimal physical and psychological support throughout the perioperative period.

2.2.2 Study methods for the observation group

2.2.2.1 Study team members and responsibility

A multidisciplinary management team was assembled, comprising a head nurse, oncologist, psychotherapist and two responsible nurses. The chief nurse assumed responsibility for overseeing the project's smooth execution and promoting collaboration among team members, which involved coordinating communication among the multidisciplinary team and ensuring seamless information flow. Additionally, the chief nurse supervised project progress and ensured adherence to planned tasks.

The oncologists contributed professional oncology expertise and clinical experience to formulate a rational treatment strategy for the project. They assisted in interpreting patient conditions and treatment outcomes, collaborating with other team members to develop adjustment plans as needed.

The psychotherapist conducted psychological evaluations to identify potential psychological issues among patients. Sequential psychological intervention was then implemented to offer emotional support and psychological counseling.

The responsible nurses were tasked with executing basic nursing duties for patients, including body position management. They established rapport with patients, comprehensively understood their needs, and provided timely feedback on patient conditions.

2.2.2.2 Intervention implementation

(1) Preoperative preparation for the problem definition phase

① Initial psychological interviews: Preliminary psychological interviews were conducted within 4 hours of admission to determine the problem stage and establish preliminary psychological profiles. These interviews, lasting approximately 30 minutes, aimed to facilitate effective communication. Family members were invited to provide additional insights, ensuring

TABLE 1. Comparison of general data ((points, $\bar{x} \pm s$), n%).

Characteristics	Observation group	Control group	χ^2/t	<i>p</i>
Age	63.78 \pm 5.58	64.76 \pm 6.50	-1.010	0.315
Education				
Primary school and junior high school	12 (22.2%)	9 (16.7%)		
Secondary School and High School	20 (37.0%)	24 (44.4%)	1.079	0.583
University and above	22 (40.7%)	21 (38.9%)		
Type of liver cancer				
Primary carcinoma of the liver	24 (44.4%)	22 (40.7%)		
Recurrent hepatocellular carcinoma	21 (28.9%)	20 (37.0%)	1.078	0.583
Metastatic hepatic carcinoma	9 (16.7%)	12 (12.2%)		
Lesion location				
Left anterior lobe	19 (35.2%)	17 (31.5%)		
Right posterior lobe	20 (37.0%)	22 (40.7%)	0.342	0.952
Left anterior and posterior lobe	6 (11.1%)	7 (13.0%)		
Right anterior and posterior lobe	9 (16.7%)	8 (14.8%)		

a comprehensive understanding. ② Focus of initial visit: The initial visit focused on obtaining detailed information regarding patients' main symptoms, including physical discomfort and pain perception, to assess preoperative physiological status. Patients were also queried about their emotional state, expectations, and concerns regarding the procedure, as well as any past experiences relevant to the surgery. ③ Detailed recording and collation. Nurses recorded patients' responses during interviews to accurately reflect their thoughts and feelings. Subsequently, the data were collated and summarized promptly to establish personalized psychological intervention programs before surgery. ④ Preoperative psychological intervention guidance: Based on the data obtained from the initial visit, a personalized preoperative psychological intervention program was tailored for each patient to address the main symptoms and emotional state conditioning. Additionally, comprehensive information was provided to address potential concerns from patients and their families, thereby enhancing understanding and acceptance of the procedure. ⑤ Attention to dynamic emotion changes: A plan for dynamic observation was devised to monitor mood fluctuations in patients before surgery. The psychological intervention program was flexible, allowing adjustments to be made as necessary in response to these changes. Additionally, data gathered during the initial visit were shared with the perioperative nursing team to ensure a comprehensive understanding of patients' psychological status prior to surgery, thereby enabling tailored support throughout the perioperative care journey.

(2) Psychological care during the problem-solving stage before treatment

① Two days before HAIC (16:30–17:00): Nurses encouraged patients to actively engage in HAIC treatment, emphasizing its importance and discussing the impact of negative emotions on clinical outcomes. Patients were educated about how emotional states may influence physical responses and were encouraged to maintain positive emotions to enhance treatment efficacy. One day before HAIC (16:00–17:00): Emotion reg-

ulation education was provided, focusing on teaching patients various techniques for regulating emotions, such as attention diversion methods. Patients were encouraged to engage in activities such as watching shows, listening to music, taking walks or talking to family or roommates to distract from disease treatment, fostering a positive attitude towards treatment. ② One day before HAIC (17:00–17:30): Confidence therapy sessions were conducted to enhance patients' confidence for the treatment to be undergone. Nurses described the advancements and success stories of modern diagnosis and treatment techniques to instill confidence in patients. Patients were encouraged to affirm positive beliefs about their treatment outcomes each morning. Through sharing successful cases and technological advancements, patients were guided to strengthen positive thinking and foster positive treatment expectations. ③ Intraoperative psychological support: Prior to surgery, efforts were made to stabilize patients' psychological states and alleviate preoperative tension. Emotional communication, encouragement and support were provided to reassure patients both before and during the procedure, fostering a relaxed atmosphere and promoting psychological well-being.

(3) Psychological support during the problem-solving phase after treatment

① Day of surgery (hourly ward rounds): Nurses conducted hourly ward rounds to monitor patients' vital signs and ensure physiological stability. They proactively inquired about any discomfort experienced by patients, addressing subjective feelings and promptly resolving potential issues. Patients were closely observed for adverse reactions, both physical and psychological, and appropriate nursing measures were promptly implemented. Any concerns or problems raised by patients were recorded and addressed promptly. ② First day after surgery (8:30–9:00): During the patient's ward rounds on the first day after surgery, nurses addressed any questions or concerns the patient may have had, providing information support and alleviating restlessness and doubts. Continued attention was given to any complaints of adverse reactions

or discomfort, with timely intervention measures. Communication during visits and patient feedback were recorded to inform subsequent care provision. ③ Second day after surgery (8:30–9:00): Nurses actively engaged with patients to understand their overall feelings and monitor changes in their psychological and physical status. Communication aimed to provide emotional support, and encourage active participation in the rehabilitation process. Patient feedback and feelings were recorded, shared with the team, and adjusted in a timely manner to optimize postoperative psychological support.

(4) Psychological support during the problem-solving stage before discharge

① The day of discharge (8:30–9:00): Before discharge, the discharge process and necessary precautions were thoroughly explained to ensure patients had a clear understanding of post-discharge procedure. Personal health records were established for each patient, and a WeChat group was created as a communication platform to facilitate ongoing contact with medical staff. Members of the psychological intervention team acted as group administrators, providing patients with engaging activities to foster interaction, mutual encouragement and support. Team members signed confidentiality agreements to ensure patient privacy, and all patient data were designated for academic research purposes only. ② Postoperative follow-up: Regular psychological follow-up was conducted *via* the WeChat group to monitor patients' post-discharge progress and address any physical or psychological changes. Members of the psychological support group promptly responded to patients' inquiries, alleviating any post-discharge concerns. The WeChat group served as a platform for sharing rehabilitation experiences, motivating patients to actively engage in the rehabilitation process, and promoting communication and mutual assistance among patients.

2.2.2.3 Body position management measures

① Immediate Postoperative Period (0–1.5 hours after operation), when compression bandaging was not relieved (0–1.5 hours after operation): The patient's recumbent angle ranged between 30 and 45 degrees, with the operated side kept straight to alleviate compression on the surgical area. Catheter fixation was checked to ensure it remained secure and in place. ② Early postoperative period (1.5–2 hours after compression bandaging relief): The patient's body position was transitioned horizontally on the bed, gradually straightening the operated side. This adjustment allowed patients to adapt to changes in recumbent position, alleviated body stiffness and promoted blood circulation in the operation area. ③ Extended postoperative period (8 hours after compression bandaging relief): Patients were allowed to choose lateral decubitus positions, ensuring the operated lower limb remained straight. The upper body maintained a recumbent angle of 35 to 110 degrees with the thigh, facilitating appropriate extension of the surgical site. ④ Decubitus to the unaffected side: Patients were positioned on the unaffected side, with the operated limb straightened. A soft cotton pad was placed between the legs to prevent discomfort in the catheter area on the operated side. ⑤ Turning care: The patients were advised in advance of intentions for changing their position (turning over) to ensure patient cooperation. The catheter position was checked

before turning to ensure that the catheter was not pulled or compressed. Care aids such as care belts or skateboards were utilized to reduce the burden on patients and caregivers. The turning process was conducted gradually to ensure that the patient's spine remains centered and avoid excessive twisting. Skincare was prioritized, with a thorough examination for abnormalities. Turning frequency was controlled. The patients were encouraged to participate actively in the turning process, which improved their autonomy and confidence in rehabilitation.

2.3 Outcome measures

2.3.1 Psychological status

The psychological status of both groups was evaluated using the Depression Anxiety and Stress Scale (DASS-21, short version) [9]. This scale consists of three subscales: depression (7 items), anxiety (7 items) and stress (7 items), with scores ranging from 0 to 3 indicating the frequency of experiencing symptoms from "not met" to "always met". Each subscale's scoring pattern was applied, and the final score was obtained by multiplying the calculation result by 2. A higher score indicated more severe negative emotions. The scale demonstrated good reliability and validity, as evidenced by a Cronbach's alpha coefficient of 0.870.

2.3.2 Stress response

The level of perceived stress in both groups was evaluated using the Perceived Stress Scale (PSS) 10. This scale comprises 10 items scored on a Likert 4-level scale [10], ranging from 1 to 4 points, with a total score ranging from 10 to 40 points. A higher score indicates a greater degree of perceived stress. The scale demonstrated good reliability and validity, with a Cronbach's alpha coefficient of 0.826.

2.3.3 Adverse reactions

The incidence of urinary retention, nausea and vomiting, puncture site bleeding, low back pain and insomnia was monitored within 2 to 4 hours following the operation. The nursing staff calculated the incidence of adverse events.

2.3.4 Comfort ratings

Postural comfort questionnaire was used to investigate the patients. The questionnaire was divided into physical, psychological and social dimensions, with a total of 25 items, including 5 options of "none", "some", "quite" and "very", which were counted as 0–4 points, with item 1, 7, 12, 13, 14 and 23 being reverse-scored questions. Reverse scoring was used. The total score of the questionnaire was 100 points. The higher the score, the higher the patient comfort. Cronbach's alpha coefficient was 0.869, which had good reliability and validity.

2.4 Statistical analysis

SPSS 25.0 (IBM Corporation, Armonk, NY, USA) was employed for data analysis, measurement data were tested for normality and homogeneity of variance. Data conforming to normal distribution were described as mean \pm standard deviation ($\bar{x} \pm s$); non-normal distribution data were described

as median (quartiles). Enumeration data were described using frequency, constituent ratio and rate. Comparisons between groups were performed with the χ^2 and Fisher exact tests. $p < 0.05$ indicated that the differences were statistically significant.

3. Results

3.1 General data comparison between the two groups

There was no significant difference in the general data between the two groups ($p > 0.05$). The outcomes were shown in Table 1.

3.2 Comparison of psychological status between the two groups

Before nursing, there were no significant differences in the scores of depression, anxiety and stress subscales of the DASS-21 between the two groups ($p > 0.05$). However, after nursing, the scores of the DASS-21 subscales, including depression, anxiety and stress scales, were significantly lower in the observation group compared to the control group, with statistically significant differences ($p < 0.05$). These outcomes are presented in Table 2.

3.3 Comparison of degree of perceived stress between the two groups

Before nursing, there was no significant difference in the PSS scale score between both groups ($p > 0.05$). However, after nursing, the CF score of the observation group was found to be lower than that of the control group, with a statistically significant difference ($p < 0.05$). These results are summarized in Table 3.

3.4 Comparison of the overall incidence of adverse reactions between both groups

After nursing, the total incidence of adverse reactions in the observation group was significantly lower compared to the control group, with a statistically significant difference ($p < 0.05$). These outcomes are presented in Table 4.

3.5 Comparison of comfort score between the two groups

After nursing, the postoperative comfort of the two groups was compared. The scores of physical, physiological, psychological and social dimensions in the observation group were better than that in the control group, and the differences were statistically significant ($p < 0.05$). The outcomes were manifested in Table 5.

4. Discussion

4.1 Sequential psychological intervention combined with body position management can effectively improve the psychological status of patients

Patients with primary liver cancer undergoing transcatheter arterial chemoembolization (HAIC) may face anxiety, depression, decreased self-esteem and social problems. These psychological problems can affect treatment outcomes, quality of life and rehabilitation processes. Therefore, timely intervention and support of patients' mental health are essential. The integration of sequential psychological intervention and body position management is shown to produce a synergistic effect, effectively meeting the comprehensive nursing needs of patients [11]. In this study, the observation group exhibited significantly lower scores on anxiety, depression and stress scales compared to the control group ($p < 0.05$), indicating a substantial improvement in patients' psychological well-being resulting from the implementation of psychological intervention combined with body position management. This improvement can be attributed to several factors. The main reason is that the observation group utilized preoperative sequential psychological intervention and emotional support, aiding patients in better understanding and coping with the stress of surgery [4]. Meanwhile, it effectively relieved depression and anxiety, thereby enhancing patients' ability to cope with surgical procedures [12]. Secondly, the implementation of preoperative psychological preparation assisted patients in understanding the surgical procedure and postoperative rehabilitation, thereby reducing fear of the unknown. It contributed to a reduction in preoperative tension, resulting in a more positive psychological state post-surgery [13]. Therefore, this study helps to reduce anxiety and stress of patients and improve the patient's mental status by providing psychological care support, including emotional support, psychoeducation and psychological counseling.

4.2 Sequential psychological intervention combined with body position management can effectively improve patients' perceived stress

Patients with primary liver cancer undergoing transcatheter arterial chemoembolization (HAIC) face negative emotions caused by anxiety, fear, uncertainty and physical discomfort. Such psychological stress can reduce patients' treatment compliance, decrease quality of life, and even affect the function of the immune system. Therefore, timely reduction of patients' psychological pressure, provision of professional psychological support and intervention are essential to ensure the efficacy of treatment. Sequential psychological interventions equip patients with coping skills for anxiety and tension, such as deep breathing, relaxation training and positive thinking, thereby mitigating preoperative and intraoperative tension. The findings of our study revealed that the perceived stress score of the observation group was significantly lower than that of the control group ($p < 0.05$), indicating notable success in reducing patients' stress perception through psychological intervention [14]. This success could be primarily attributed to preoperative psychological preparation, which enhances pa-

TABLE 2. Comparison of DASS-21 scale scores between the two groups (points, $\bar{x} \pm s$).

Groups	No. of case	Depression scale		Anxiety scale		Stress scale	
		Pre-intervention	Post Intervention	Pre-intervention	Post Intervention	Pre-intervention	Post Intervention
Observation group	54	11.93 \pm 1.18	8.72 \pm 1.04	9.07 \pm 1.19	6.17 \pm 0.72	15.43 \pm 1.68	14.17 \pm 1.15
Control group	54	11.54 \pm 1.41	9.17 \pm 1.15	9.02 \pm 1.81	9.04 \pm 1.15	15.48 \pm 1.87	14.93 \pm 1.18
<i>t</i>		1.554	-2.115	0.282	-15.560	-0.162	-3.394
<i>p</i>		0.123	0.037	0.778	<0.001	0.871	0.001

TABLE 3. Comparison of PSS scores between the two groups (points, $\bar{x} \pm s$).

Groups	No. of case	PSS	
		Pre-intervention	Post Intervention
Observation group	54	27.81 \pm 3.59	13.56 \pm 1.76
Control group	54	27.52 \pm 3.74	15.67 \pm 1.30
<i>t</i>		0.420	-7.096
<i>p</i>		0.675	<0.001

PSS: Perceived Stress Scale.

TABLE 4. Comparison of overall incidence of adverse reactions between the two groups (n (%)).

Groups	No. of case	Urinary retention	Nausea and vomiting	Puncture site bleeding	Low back soreness	Insomnia	Overall incidence
Observation group	54	2 (3.7%)	5 (9.3%)	3 (5.6%)	2 (3.7%)	4 (7.4%)	16 (29.6%)
Control group	54	5 (9.3%)	7 (13.0%)	3 (5.6%)	5 (9.3%)	6 (11.1%)	26 (48.1%)
χ^2							_*
<i>p</i>							0.048

*Fisher test.

TABLE 5. Comparison of postoperative comfort scores between the two groups (points, $\bar{x} \pm s$).

Groups	Physical dimension	Physiological dimension	Psychological dimension	Social dimension
Observation group	11.00 \pm 2.18	10.85 \pm 2.44	10.85 \pm 2.44	7.30 \pm 2.12
Control group	7.67 \pm 2.31	6.96 \pm 2.18	27.17 \pm 4.64	4.83 \pm 2.23
<i>t</i>	7.451	8.451	8.639	5.470
<i>p</i>	<0.001	<0.001	<0.001	<0.001

tients' understanding of the procedure, postoperative rehabilitation and discomfort, thereby reducing fear of the unknown [15]. Through early information transmission and emotional guidance, patients are taught negative emotion regulation, so that patients can more fully prepare themselves and reduce fear of the unknown, thereby reducing preoperative stress perception. Secondly, psychological support groups offer additional emotional support post-surgery through various psychological support pathways, aiding patients in managing mood swings [16, 17]. Li Q *et al.* [18] reported the effectiveness of psychological intervention combined with body position management, involving psychologists, nursing staff and other healthcare team members, in providing comprehensive patient

support and reducing the perception of surgical stress [19]. It was consistent with the outcomes of this study.

4.3 Sequential psychological intervention combined with body position management can effectively reduce the incidence and comfort of adverse reactions in patients

Comfort in patients undergoing hepatic arterial infusion chemotherapy (HAIC) for primary liver cancer is influenced by many factors like physical discomfort, pain, nausea and vomiting during treatment. Prolonged maintenance of the unity position post-surgery may result in muscle soreness,

fatigue, irritability and other physical and psychological discomforts. Proper position management can enhance patients' blood circulation and respiratory function, thereby improving their comfort. Thus, patients can change body positions to alleviate discomfort [7, 20]. Our study outcomes indicated a notably lower incidence of adverse reactions in the observation group compared to the control group, with the observation group also reporting superior comfort levels ($p < 0.05$), highlighting that sequential psychological intervention combined with body position management can reduce adverse reactions and enhance patient comfort. The main reason is that multidisciplinary teams work together to complete preoperative psychological support and health education, which helps patients to better understand the surgical process and enhance postoperative coping ability [19, 21]. As for psychological support in the problem-solving stage after treatment, it gives the patient a sense of security through hourly patrol, which timely detects the patient's adverse reactions, and reduces the maladjustment of the postoperative symptoms. Meanwhile, timely answer the patient's questions and encourage the patient to maintain self-confidence in rehabilitation, thereby promoting physical and psychological balance and reducing the patient's physical tension [22, 23]. This balanced state is conducive to maintaining stability in the immune and autonomic nervous systems, consequently reducing the risk of post-surgical adverse effects. Furthermore, attention to body position management and strategic changes based on constant pressure at specific puncture points, as demonstrated by Nam *et al.* [24], can reduce complications resulting from patients' self-repositioning, aligning with our study findings [24]. Therefore, rational and scientific body position changes may enhance patients' blood circulation, improve comfort and mitigate discomfort from prolonged immobilization [25]. It is important in the process of hepatic arterial infusion chemotherapy for primary liver cancer.

5. Conclusions

In summary, sequential psychological intervention combined with body position management has a good effect during hepatic arterial infusion chemotherapy for primary liver cancer. Patients in the observation group exhibited improved psychological well-being, evidenced by lower stress perception, higher comfort scores, better psychological status and lower incidence of adverse reaction. However, this study also has limitations. It was conducted at a single center and the sample size is small, suggesting the need for future research to expand the sample size to encompass a broader patient population and provide a more comprehensive understanding of the effectiveness of implementing psychological intervention combined with position management. Additionally, extending the duration of follow-up would offer insights into the long-term sustainability and adaptability of the intervention, thereby enhancing the robustness of the study's conclusions.

AVAILABILITY OF DATA AND MATERIALS

The authors declare that all data supporting the findings of this study are available within the paper and any raw data can be

obtained from the corresponding author upon request.

AUTHOR CONTRIBUTIONS

WWZ—designed the study and carried them out. WWZ, HQY, LXF and YYW—supervised the data collection, analyzed the data, interpreted the data. WWZ and YYW—prepared the manuscript for publication and reviewed the draft of the manuscript. All authors have read and approved the manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval was obtained from the Ethics Committee of The Second Affiliated Hospital of Wenzhou Medical University (Approval no. 2023480). Written informed consent was obtained from a legally authorized representative for anonymized patient information to be published in this article.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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