Original Article
Comprehensive nursing reduces postoperative adverse emotions and complications of advanced liver cancer patients undergoing transcatheter arterial chemoembolization

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Abstract: Objective: This study aimed to explore the effect of comprehensive nursing intervention on the quality of life, complications and survival of patients with advanced liver cancer. Method: Altogether 160 patients with advanced liver cancer who underwent transcatheter arterial chemoembolization (TACE) were divided into control group and study group, 80 cases in each group. The control group received routine nursing, while the research group received comprehensive nursing. The severity of anxiety, depression, pain and other indicators before and after treatment were compared between the two groups. The complications, operation duration, bed rest duration, hospitalization duration, nursing satisfaction, survival condition and quality of life of the two groups were compared. Result: After treatment, the scores of self-rating anxiety scale, self-rating depression scale and visual analogue scale in the study group were significantly lower than those in the control group (P < 0.05). The number of postoperative complications in the study group was significantly lower than that in the control group (P < 0.05). The duration of surgery, bed rest and hospitalization in the study group were significantly shorter than those in the control group (P > 0.05). The nursing satisfaction score of the study group was significantly higher than that of the control group (P < 0.05). The 12 overall survival rate of the study group was significantly higher than that of the control group (P=0.033, log-rank test). The study group was significantly better than the control group in disease control, life behavior, exercise and psychological and emotional changes (P < 0.05). Conclusion: Comprehensive nursing can reduce postoperative adverse emotions and complications of advanced liver cancer patients undergoing TACE, improve their survival rate and quality of life, and is worthy of clinical application.

Keywords: Comprehensive nursing, liver cancer, interventional therapy, complication

Introduction
Liver cancer is the fifth most common cancer among men, the ninth most common cancer among women, and the second leading cause of cancer death worldwide [1]. According to statistics, the five-year survival rate of liver cancer patients in most countries is only 10-20% [2]. At present, liver transplantation, partial hepatectomy and ablation can be used in the early stage of liver cancer treatment, and the 5-year survival rate can be close to 70%. However, since early liver cancer has no obvious symptoms, most patients are already in the late stage of diagnosis and have lost the chance of cure. For advanced liver cancer, interventional treatment such as embolism and chemotherapy can only be used clinically to prolong the life of patients [3, 4]. Transcatheter arterial chemoembolization (TACE) is the main treatment method for patients with advanced liver cancer, which has good curative effect and can cause tumor necrosis, thus prolonging the life of patients [5]. However, patients with advanced liver cancer receiving TACE often suffer from complications of different degrees, which seriously affect the recovery and quality of life of patients. Therefore, high-quality nursing inter-
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vention should be adopted to reduce the complications of patients at the same time of treatment.

With the development of economy, people’s living standard is continuously improving, and the demand for medical treatment and services is also increasing. The traditional disease-centered nursing mode has gradually failed to meet the nursing needs of patients [6]. Comprehensive nursing mode is a human-oriented new nursing mode. It comprehensively evaluates the patient’s physical quality, psychological state, disease development and other factors affecting the patient’s prognosis, so as to formulate an organized and planned individualized nursing scheme and improve the patient’s prognosis and quality of life [7, 8]. At present, many studies have shown that comprehensive nursing is superior to conventional nursing. For example, there are studies comparing the effects of comprehensive nursing and conventional nursing on acute perioperative delirium of elderly hip fracture patients, the results show that comprehensive nursing can significantly reduce the incidence of perioperative delirium of patients [9]. Other research results show that comprehensive nursing intervention can improve the clinical efficacy and quality of life of breast cancer patients [10].

At present, there are few researches on the application of comprehensive nursing in patients with advanced liver cancer. The comprehensive nursing and conventional advanced liver cancer nursing were used in this study for patients with advanced liver cancer, so as to explore the practical value of comprehensive nursing in patients with advanced liver cancer and provide better nursing scheme for patients with advanced liver cancer.

Materials and methods

General data

Altogether 160 patients with advanced liver cancer who were admitted to our hospital from January 2017 to June 2018 to undergo TACE were selected as the study subjects. Inclusion criteria: All patients met the staging criteria of Barcelona (BCLC) for advanced liver cancer [11]; the patients aged 40-75 years, with a primary school education level or above; the survival period was expected to be no less than 2 months. Exclusion criteria: patients with other serious organ diseases; patients participated in other clinical studies at the same time; patients with communication disorders; patients with contraindications to TACE surgery. This study was approved by the Ethics Committee of our hospital. The subjects and their families were informed and signed a fully informed consent form.

Treatment methods

Altogether 160 subjects were randomly divided into control group and study group, both groups of patients were treated with TACE. After local anesthesia, Seldinger puncture technique was used to inject drugs into tumor blood supply arteries, including adriamycin, epirubicin, and hydroxycamptothecin, etc. under the guidance of imaging equipment. Iodized oil was then used as embolic drug injection.

Nursing methods

The control group was given routine care, including vital signs monitoring, life health education, daily diet guidance, patient pain care and medication according to doctor’s advice.

At present, there are few researches on the application of comprehensive nursing in patients with advanced liver cancer. The comprehensive nursing and conventional advanced liver cancer nursing were used in this study for patients with advanced liver cancer, so as to explore the practical value of comprehensive nursing in patients with advanced liver cancer and provide better nursing scheme for patients with advanced liver cancer.

Nursing methods

Preoperative nursing: (1) Disease condition nursing: the patient’s vital signs after admission were checked, such as respiration, body temperature, body weight, heart rate, blood pressure, etc.; the living habits, adverse symptoms and changes of the patient’s condition were closely observed and recorded; a comprehensive understanding of the patient’s physical condition was carried out to facilitate subsequent intensive intervention. (2) Psychological nursing: according to different psychological qualities of patients, a “customized” scientific and effective psychological dredging scheme was formulated, which mainly includes explaining liver cancer-related knowledge, TACE treatment process and attention to patients in detail, deepening patients’ understanding of diseases and treatment methods, eliminating patients’ anxiety and fear of unknown things and other adverse emotions, and enhancing patients’ treatment compliance; nursing staff actively communicate with patients, put themselves in a position to share psychological pres-
sure for patients, and encourage patients to open their hearts and release pressure. (3) Environmental nursing: a quiet and comfortable hospital environment with soothing light music was provided to reduce the emotional fluctuations caused by the environment and relax the mood of patients. (4) Nutritional care: a quiet environment was provided, different dietary plans according to the patient’s dietary habits and physical conditions were made, and foods with high calorie, high protein, rich vitamins, easy digestion, and balanced nutrition were selected. (5) Family nursing: as patients with advanced liver cancer are often hospitalized, which can easily lead to the exhaustion of the patients’ families, nursing staff needed to provide psychological counseling to the patients’ families in time so that they can actively cooperate with doctors and face the patients bravely.

**Intraoperative nursing:** During the surgical treatment, the nursing staff actively communicate with the patient and appease the patient’s emotions, explain the surgical progress when necessary, and eliminate the patient’s worries.

**Postoperative nursing:** (1) Complication nursing: various physical indexes of the patient were strictly and closely monitored to prevent the occurrence of major complications, such as fever, deep vein thrombosis, urinary retention, nausea and vomiting, bleeding at puncture site, etc. If the patient has normal or serious adverse physiological indexes, symptomatic treatment shall be adopted immediately. If complications occur, symptomatic treatment should be adopted immediately. (2) Pain nursing: If the patient suffers from unbearable pain, pain-relieving drugs will be immediately given to control the pain, and the patient’s attention need to be diverted by means of games, chatting, video and audio so as to relieve the pain. (3) Discharge guidance: according to the patient’s age, educational background, family status, living environment and other specific circumstances, before the patient is discharged from the hospital, “customize” a set of programs for family members, and open a nursing hotline to the patient’s family to understand the patient’s physical condition.

**Observation index**

The self-rating anxiety scale (SAS) [12] was used to assess the anxiety state of patients before and after nursing, with a total score of 100 points. A score of 50-70 points indicates mild anxiety, a score of 71-90 points indicates moderate anxiety, a score more than 90 points indicates severe anxiety, and the higher score was closely related to the seriousness of the anxiety.

The self-rating depression scale (SDS) [13] was used to assess the depression status of patients before and after nursing, with a total score of 100 points. A score of 50-70 points indicates mild depression, a score of 71-90 points indicates moderate depression, a score more than 90 points indicates severe depression, and the higher score was closely related to the seriousness of the anxiety.

Visual analogue scale (VAS) [14] was used to evaluate the pain degree of patients before and after nursing. A VAS score of 0 indicates no pain, and a VAS score of 10 indicates the most severe pain. The higher score was closely related to the seriousness of the pain.

The quality of life questionnaire (QLQ-C30) [15] was used to evaluate the patients’ quality of life 2 months after treatment, including 4 items (disease control, life behavior, exercise and psychological and emotional changes). Each item scored 100 points, and the higher score was closely related to the better quality of life.

The postoperative complications of the two groups of patients were observed and recorded, mainly including fever, deep vein thrombosis, urinary retention, nausea and vomiting, bleeding at puncture site, etc. The operation time, bed rest time and hospitalization time of the two groups were recorded and compared.

One day before the discharge, the self-made “nursing satisfaction questionnaire” was used to evaluate the patient’s nursing satisfaction, mainly including attitude, personality, wearing, proficiency in operation, etc. There were 20 questions, with 5 points for each question, and a total score of 100 points. The score less than 70 points as not satisfactory, 70~89 points as basically satisfactory, and more than 90 points as satisfactory.

**Follow-up**

The two groups of patients were followed up by telephone, visit and outpatient service every 15 days for 12 months. The overall survival time was from the first day after treatment until the last follow-up or death.
**Table 1.** Comparison of general data between two groups of patients ((n (%)), x ± sd)

<table>
<thead>
<tr>
<th>Group</th>
<th>Control group (n=80)</th>
<th>Research group (n=80)</th>
<th>χ²/F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>1.358</td>
<td>0.244</td>
</tr>
<tr>
<td>Male</td>
<td>49 (61.25)</td>
<td>56 (70.00)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>31 (38.75)</td>
<td>24 (30.00)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average age (years)</td>
<td>56.34±7.98</td>
<td>58.23±8.24</td>
<td>1.474</td>
<td>0.143</td>
</tr>
<tr>
<td>Average body weight (KG)</td>
<td>61.24±8.33</td>
<td>63.56±7.78</td>
<td>1.821</td>
<td>0.071</td>
</tr>
<tr>
<td>Average course of disease (years)</td>
<td>2.67±0.57</td>
<td>2.81±0.67</td>
<td>1.424</td>
<td>0.157</td>
</tr>
<tr>
<td>Education level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower than high school level</td>
<td>33 (41.25)</td>
<td>41 (51.25)</td>
<td>1.609</td>
<td>0.205</td>
</tr>
<tr>
<td>High school or above</td>
<td>47 (58.75)</td>
<td>39 (48.75)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diet preference</td>
<td></td>
<td></td>
<td>2.066</td>
<td>0.151</td>
</tr>
<tr>
<td>Light</td>
<td>55 (68.75)</td>
<td>63 (78.75)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greasy</td>
<td>25 (31.25)</td>
<td>17 (21.25)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residence</td>
<td></td>
<td></td>
<td>1.604</td>
<td>0.205</td>
</tr>
<tr>
<td>Urban</td>
<td>34 (42.50)</td>
<td>42 (52.50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>46 (57.50)</td>
<td>38 (47.50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise</td>
<td></td>
<td></td>
<td>0.440</td>
<td>0.507</td>
</tr>
<tr>
<td>Yes</td>
<td>30 (37.50)</td>
<td>26 (32.50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>50 (62.50)</td>
<td>54 (67.50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td>1.846</td>
<td>0.397</td>
</tr>
<tr>
<td>Married</td>
<td>61 (76.25)</td>
<td>65 (81.25)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unmarried</td>
<td>10 (12.50)</td>
<td>5 (6.25)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divorce</td>
<td>9 (11.25)</td>
<td>10 (12.50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking history</td>
<td></td>
<td></td>
<td>0.401</td>
<td>0.527</td>
</tr>
<tr>
<td>Yes</td>
<td>68 (85.00)</td>
<td>65 (81.25)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>12 (15.00)</td>
<td>15 (18.75)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drinking history</td>
<td></td>
<td></td>
<td>2.771</td>
<td>0.096</td>
</tr>
<tr>
<td>Yes</td>
<td>70 (87.50)</td>
<td>62 (77.50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>10 (12.50)</td>
<td>18 (22.50)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Statistical method**

SPSS 21.0 (IBM Corp, Armonk, NY, USA) was used for statistical analysis, and GraphPad Prism 7 was used to visualize the data. In this study, the counting data was expressed by [n (%)], the comparison of the counting data between groups was represented by chi-square test, the measurement data was expressed by mean ± standard deviation (x ± sd), the comparison of the measurement data between groups was performed by t-test. Kaplan-Meier method was used to establish survival curves for the two groups of patients, and Log-rank test to evaluate the difference of survival curves between the two groups. When P < 0.05, the difference was considered statistically significant.

**Result**

**Comparison of general data between two groups of patients**

There was no significant difference between the two groups in general data such as gender, average age, average weight, average course of disease, educational level, diet preference, residence, exercise habit, marital status, smoking history, drinking history, etc. (P > 0.05) (Table 1).

**Comparison of SAS, SDS, VAS scores before and after nursing between the two groups**

Before nursing, the SAS scores of the control group and the research group were 56.57±5.82 and 57.86±4.78 respectively (P > 0.05). After nursing, the SAS scores of the control group and the research group were 46.62±4.98 and 39.23±5.25 respectively, which were significantly lower than those before nursing, and the research group was significantly lower than the control group (P < 0.05) (Figure 1A).

Before nursing, the SDS scores of the control group and the research group were 61.58±4.54 and 60.77±4.78, respectively (P > 0.05). After nursing, the SDS scores of the control group and the research group were 51.44±4.44 and 42.84±4.64 respectively, which were significantly lower than those before nursing, and the research group was significantly lower than the control group (P < 0.05) (Figure 1B).

Before nursing, the VAS scores of the control group and the research group were 5.57±0.82 and 5.86±0.78, respectively (P > 0.05). After nursing, the VAS scores of the control group and the research group were 4.02±0.57 and 3.25±0.45 respectively, which were significantly lower than those before nursing, and the research group was significantly lower than the control group (P < 0.05) (Figure 1C).
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3.13±0.46 respectively, which were significantly lower than those before nursing, and the research group was significantly lower than the control group (P < 0.05) (Figure 1C).

Comparison of operation duration, bed rest duration and hospitalization duration between the two groups

The duration of surgery, bed rest and hospitalization in the study group were significantly shorter than those in the control group (P > 0.05). See Table 3.

Comparison of quality of life between two groups of patients after treatment

After treatment, the study group was significantly better than the control group in disease control, life behavior, exercise and psychological and emotional changes (P < 0.05) (Table 4).

Comparison of satisfaction of nursing between two groups of patients

The nursing satisfaction scores of the control group and the research group were 81.66±4.89 and 93.35±3.68, respectively, and the nursing satisfaction score of the research group was significantly higher than that of the control group (P < 0.05) (Figure 2).

Survival analysis of two groups of patients 12 months after discharge

The 12-month overall survival rates of the control group and the study group after discharge were compared.

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**Table 2.** Comparison of complications between two groups of patients [n (%)]

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of cases</th>
<th>Fever (n, %)</th>
<th>Deep vein thrombosis (n, %)</th>
<th>Nausea and vomiting (n, %)</th>
<th>Bleeding from puncture point (n, %)</th>
<th>Urinary retention (n, %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control group</td>
<td>80</td>
<td>36 (45.00)</td>
<td>3 (3.75)</td>
<td>27 (33.75)</td>
<td>11 (13.75)</td>
<td>18 (22.50)</td>
</tr>
<tr>
<td>Research group</td>
<td>80</td>
<td>21 (26.25)</td>
<td>0 (0.00)</td>
<td>10 (12.50)</td>
<td>2 (2.50)</td>
<td>5 (6.25)</td>
</tr>
<tr>
<td>χ²</td>
<td></td>
<td>6.132</td>
<td>3.057</td>
<td>10.160</td>
<td>6.782</td>
<td>8.581</td>
</tr>
<tr>
<td>P</td>
<td></td>
<td>0.013</td>
<td>0.080</td>
<td>0.001</td>
<td>0.009</td>
<td>0.003</td>
</tr>
</tbody>
</table>

**Table 3.** Comparison of operation duration, bed rest duration and hospitalization duration between the two groups (x ± sd)

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of cases</th>
<th>Operation duration (min)</th>
<th>Bed rest duration (h)</th>
<th>Hospitalization duration (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control group</td>
<td>80</td>
<td>68.24±14.24</td>
<td>45.52±5.26</td>
<td>10.21±2.33</td>
</tr>
<tr>
<td>Research group</td>
<td>80</td>
<td>81.24±16.66</td>
<td>54.23±6.98</td>
<td>14.24±3.11</td>
</tr>
<tr>
<td>t</td>
<td></td>
<td>5.305</td>
<td>8.914</td>
<td>9.276</td>
</tr>
<tr>
<td>P</td>
<td></td>
<td>&lt; 0.001</td>
<td>&lt; 0.001</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>
were 53.75% (43/80) and 67.50% (54/80), respectively. The 12-month overall survival rate of the study group after discharge was significantly higher than that of the control group (P=0.033, log-rank test) (Figure 3).

**Discussion**

Comprehensive nursing is different from the conventional nursing mode, which is to systematize the nursing mode and people oriented, define the nursing philosophy and responsibilities, provide scientific, high-quality and efficient nursing services for patients, and customize the “customized” nursing plan according to the changes of patient’s condition and physical condition to provide a comfortable nursing service for patients and promote the recovery of patients [16, 17]. At present, comprehensive nursing has shown advantages in various diseases. For example, the research of Samus et al. [18] shows that comprehensive nursing can improve the independent ability of dementia patients to stay at home, improve the quality of life treatment and nursing, and reduce the overall medical care cost of patients compared with conventional nursing. Huang et al. [19] conducted long-term comprehensive care for lung cancer patients in their research. The results show that the comprehensive care mode is feasible, effective and accepted by the majority of patients.

Patients with advanced cancer often have negative emotions of depression, anxiety, anger and even suicide, which have serious adverse effects on the health and quality of life of patients [20]. Some studies show that keeping optimistic and confident may be of great help in treating various diseases, and improving negative emotions is related to reducing the risk of depression [21]. It can be seen that it plays an important role in reducing patients’ bad emotions. Therefore, scientific and effective psychological counseling programs are formulated according to the psychological quality of patients in this study. The results show that after nursing, the SAS score and SDS score in the study group are significantly lower than those in the control group (P=0.001, log-rank test) (Figure 3).
resulting in a serious decline in patients’ quality of life [22]. Therefore, this study also focuses on pain nursing. The results show that after nursing, the SVS score of the study group is significantly lower than that of the control group, which indicates that comprehensive nursing can significantly reduce the pain of liver cancer patients compared with conventional nursing, thus further improving the negative emotions of patients. Some studies have shown that prevention of major complications after TACE treatment for liver cancer patients is crucial, because these complications will lead to prolonged hospitalization, permanent adverse sequelae, increased medical burden, and even death of patients [23]. Therefore, this study aimed at the prevention of major complications after treatment. The results showed that the number of postoperative complications such as fever, nausea and vomiting, hemorrhage at puncture points and urinary retention in the study group is significantly lower than that in the control group. This indicated that comprehensive nursing can effectively reduce the complications of liver cancer patients after interventional treatment compared with conventional nursing. We also recorded and compared the operation duration, bed rest duration and hospitalization duration of the two groups of patients. The results also showed that comprehensive nursing is superior to conventional nursing. This study also evaluated the patients’ satisfaction with the two nursing modes. The results showed that comprehensive nursing was also better than routine nursing in terms of nursing satisfaction, which also indicated that patients needed high-quality nursing.

In this study, 12-month follow-up records of patients’ survival after discharge were made. The results showed that the overall survival rate of the study group was significantly higher than that of the control group. The reasons may be that comprehensive nursing can reduce the incidence of postoperative complications of patients compared with conventional nursing. Comprehensive nursing studies have pointed out that TACE treatment of liver cancer patients will lead to a significant decline in the quality of life of patients [24]. For patients with advanced liver cancer, it is of great significance to improve their quality of life so that they can spend the rest of their lives more happily. Through the follow-up investigation on the quality of life of the two groups of patients after nursing intervention, the results showed that the study group is significantly better than the control group in disease control, life behavior, exercise and psychological and emotional changes, indicating that comprehensive nursing is also significantly better than routine nursing in improving the quality of life of patients with advanced liver cancer after TACE. A recent study retrospectively analyzed the effect of comprehensive nursing intervention on interventional therapy for patients with liver cirrhosis complicated with liver cancer. The results showed that compared with patients using conventional nursing (control group), patients using comprehensive nursing (observation group) showed significant advantages in nursing satisfaction, quality of life, incidence of postoperative complications, etc. The 20-month survival rate of the two groups of patients after treatment was investigated. The results showed that the survival rate of patients in observation group at 20 months was significantly higher than that of control group [25]. Our results are similar to their research results, which further shows that comprehensive nursing can provide benefits for advanced liver cancer patients undergoing TACE and is worthy of clinical promotion.

Although this study confirmed that comprehensive nursing intervention measures have good benefits for advanced liver cancer, there are still some deficiencies. For example, we did not investigate the quality of life of the two groups of patients before nursing, did not conduct follow-up investigation on the patients’ subsequent survival. These deficiencies will be supplemented and improved in future studies.

To sum up, comprehensive nursing can reduce postoperative adverse emotions and complications of advanced liver cancer patients undergoing TACE, and improve their survival rate and quality of life, which is worthy of clinical application.

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Disclosure of conflict of interest

None.
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