Original Article

Effect of nursing mode under the seamless connection between operating room and ward on severe traumatic brain injury patients in coma

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Abstract: Objective: The goal of the present study was to test the effects of the nursing mode under the seamless connection between operating room and ward on severe traumatic brain injury (STBI) patients in coma period. Methods: Totally, 120 STBI inpatients in coma admitted to our hospital from June 2018 to June 2019 were recruited and equally randomized into a study group and a control group. The control group underwent routine neurosurgery nursing, while the study group received nursing with seamless connection between the operating room and the ward. Clinical effects of the two groups were compared. Results: No significant differences were shown in terms of gender ratio, age, body mass index (BMI), systolic blood pressure, diastolic blood pressure, clinical manifestations and residence between the two groups of patients (P > 0.05); the Glasgow Coma Scale (GCS) scores of the two groups of patients after nursing were significantly higher than those before nursing (P < 0.001), and the GCS score of patients in the study group after nursing was found to be higher than that in the control group (P < 0.001); no discernable difference in Barthel index between the two groups of patients after one week of nursing was observed (P > 0.05), and the Barthel index of the patients in the study group after 1 month and 2 months of nursing was significantly higher than that of the control group (P < 0.001); neuron-specific enolase (NSE) and myelin basic protein (MBP) in the study group after nursing were significantly lower than those in the control group (P < 0.001); the total clinical effective rate of the study group was found to be significantly higher than that of the control group (P < 0.001); for the recovery time, the study group performed better than the control group (P < 0.001). Conclusion: The nursing with seamless connection between operating room and ward has the potential to improve the degree of coma in STBI patients and their activities of daily living.

Keywords: Seamless connection between operating room and ward, nursing model, severe head injury, coma, effect

Introduction

Severe traumatic brain injury (STBI) is defined as the brain tissue injury caused by external forces acting directly or indirectly on the head, and STBI is also perceived as a coma for more than 6 h after the injury [1, 2]. After the injury, dizziness, nausea, disturbance of consciousness, seizure and other symptoms usually occur, and hernia of the brain may endanger life in severe cases. In view of this, the treatment for STBI should be focused on emergency care, with debridement and correction of shock as the main principles. According to the latest data released by the World Health Organization [3], the incidence of STBI is increasing yearly. In 2018, about 730,000 people died of STBI worldwide. Brain trauma can cause temporary or permanent dysfunction of brain, resulting in physical or language dysfunction, and seriously affecting the quality of life.

As a common neurosurgical disease, STBI treatment often highlights lifesaving while ignoring the recovery of early functions. For STBI patients whose vital signs have returned to normal, functional rehabilitation training should be carried out in a timely manner to reduce the occurrence of sequelae and complications and the disability rate, and improve the recovery rate [4-6]. The nursing model under the seamless connection of operating room
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and ward can provide STBI patients with complete and continuous clinical nursing services, cover the deficiencies of traditional nursing model, comprehensively improve the quality of nursing services, and speed up rehabilitation [7, 8]. In this regard, the current study aimed to further explore the application effect of the seamless connection of operating room and ward nursing mode on STBI patients in the coma stage.

Materials and methods

General materials

A total of 120 STBI inpatients admitted to our hospital from June 2018 to June 2019 were selected as study subjects and randomly divided into the study group and the control group.

Inclusion criteria

① Patients who met the diagnostic criteria for STBI [9]; ② Coma after injury ≥6 h; ③ All vital signs were stable. This study was approved by the ethics committee of our hospital. The family members knew the purpose and process of this experiment and signed the informed consent.

Exclusion criteria

① Severe abdominal and thoracic injuries; ② Pregnant patients; ③ Severe rebleeding, cerebral hernia and epilepsy occurred during the treatment; ④ Heart, kidney, liver and other serious primary diseases.

Methods

The control group received routine neurosurgical care. Clinical care was carried out according to the ward management system, and the ward was disinfected regularly every day to reduce cross-infection. Patients were helped to turn over to prevent pressure ulcers. Patient’s back was patted regularly to drain sputum and to clear respiratory tract. The vital signs of patients were monitored and patients were appropriately restrained to prevent the occurrence of adverse events such as falling out of bed.

The study group adopted a seamless nursing mode between operating room and ward. Specific procedures were as follows. ① Team establishment. A dedicated seamless care team was established, consisting of neurosurgeons, head nurses, ICU nurses, psychological counselors, rehabilitation doctors, and dietitians. The group leader is a specialist head nurse with rich clinical experience and strong nursing ability. Team members received STBI-related knowledge training. The exchange of staff in various disciplines was strengthened, and specific nursing plans were developed. ② Division of responsibilities. Neurosurgeons were in charge of assessing patients’ clinical condition, and evaluating cranial conditions with physiological indexes. Nurses were responsible for monitoring infusion speed and salt intake, looking at patients’ breath, assessing lung function, ensuring smooth respiratory tract, adjusting medication according to the patient’s personal history, and informing patients of matters needing attention. ③ Psychological intervention. Psychological counselors strengthened counseling for patients’ family members, informed them of the incidence and the necessity of implementing treatment measures, obtaining their understanding and support. After patients woke up, psychological counseling was carried out for them to relieve their bad emotions, help build up confidence in treatment, and reduce their psychological burden. Dietitians made targeted diet plans according to the recovery of patients and reminded them to pay attention to the intake of nutrients and try to eat light and digestible food. ④ Rehabilitation training. Early limb acupuncture and massage trainings were carried out for patients in stable condition; passive training of affected limbs was performed; perception training was implemented for patients in coma stage, in which music awakening method and cold and hot thorn awakening method were adopted to promote the recovery of patients’ perception. The above training was carried out step by step.

Evaluation indexes

The Glasgow Coma Index [10] (GCS) was used to evaluate the coma degree of patients in the two groups before and after nursing. The scale includes eye opening, language and movement, with a full score of 15 points. The higher the score, the lighter the coma.
The Barthel Index Scoring Scale [11] was used to assess the daily life ability of patients in the two groups 1 week, 1 month and 2 months after nursing. There were 10 items in the scale, with the full score of 100. The higher the score was, the better the daily life ability of the patients was.

After nursing, 3 ml fasting peripheral venous blood was collected from patients in the two groups. The upper serum was obtained after centrifugation, and the levels of neuron-specific enolase (NSE) and myelin basic protein (MBP) were determined by enzyme-linked immunosorbent assay (ELISA). The kit was purchased from Shanghai Jingkang Bioengineering Co., LTD., and the kit instructions were strictly followed.

Curative effect was interpreted as follows. Markedly effective: after nursing intervention, the patient showed mild impairment of behavior and cognition, accompanied by language difficulties and other mild disabilities, and could barely take care of his/her life. Effective: the patient was conscious, but had severe physical disability and needed to carry out daily life with the assistance of others. Ineffective: long-term coma, vague consciousness, or even death. The total effective rate = markedly effective rate + effective rate.

The waking time of the two groups was recorded and compared.

Table 1. Comparison of clinical data between the two groups

<table>
<thead>
<tr>
<th>Items</th>
<th>the study group (n=60)</th>
<th>the control group (n=60)</th>
<th>χ²/t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>32 (53.33%)</td>
<td>33 (55.00%)</td>
<td>0.034</td>
<td>0.855</td>
</tr>
<tr>
<td>Female</td>
<td>28 (46.67%)</td>
<td>27 (45.00%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average age (years old)</td>
<td>41.82±3.26</td>
<td>41.84±3.28</td>
<td>0.033</td>
<td>0.973</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>21.34±1.02</td>
<td>21.36±1.04</td>
<td>0.106</td>
<td>0.915</td>
</tr>
<tr>
<td>Systolic pressure (mmHg)</td>
<td>141.35±8.73</td>
<td>141.38±8.71</td>
<td>0.019</td>
<td>0.985</td>
</tr>
<tr>
<td>Diastolic pressure (mmHg)</td>
<td>83.54±7.63</td>
<td>83.52±7.61</td>
<td>0.014</td>
<td>0.989</td>
</tr>
<tr>
<td>Clinical features</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disturbance of consciousness</td>
<td>16 (26.67%)</td>
<td>15 (25.00%)</td>
<td>0.044</td>
<td>0.835</td>
</tr>
<tr>
<td>Nausea</td>
<td>12 (20.00%)</td>
<td>14 (23.33%)</td>
<td>0.196</td>
<td>0.658</td>
</tr>
<tr>
<td>Epilepsy</td>
<td>14 (23.33%)</td>
<td>13 (21.67%)</td>
<td>0.048</td>
<td>0.827</td>
</tr>
<tr>
<td>Aphasia</td>
<td>9 (15.00%)</td>
<td>10 (16.67%)</td>
<td>0.063</td>
<td>0.803</td>
</tr>
<tr>
<td>Acroparalysis</td>
<td>9 (15.00%)</td>
<td>8 (13.33%)</td>
<td>0.069</td>
<td>0.793</td>
</tr>
<tr>
<td>Place of residence (case)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cities and towns</td>
<td>28 (46.67%)</td>
<td>26 (43.33%)</td>
<td>0.135</td>
<td>0.714</td>
</tr>
<tr>
<td>Countryside</td>
<td>32 (53.33%)</td>
<td>34 (56.67%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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Statistical analysis

All experimental data were statistically analyzed and processed by SPSS21.0 software, and GraphPad Prism 6 (San Diego Software, USA) was used for graphics rendering. The enumeration data were examined by χ² test and expressed as [n (%)], while the measurement data were examined by t test and expressed as (x±sd). The difference was calculated with a significance level of a P-value < 0.05.

Results

Comparison of clinical data

No significant difference was shown in sex ratio, age, BMI, systolic blood pressure, diastolic blood pressure, clinical manifestations and residence between the two groups (P > 0.05). See Table 1.

Comparison of GCS scores before and after nursing between the groups

The GCS scores in the two groups after nursing were improved significantly (P < 0.05), and the score in the study group was significantly higher than that in the control group (P < 0.05). See Figure 1.

Comparison of Barthel index between the two groups at different time points

Table 2 reveals that the Barthel index in the two groups after 1 week of nursing was not statistically different (P > 0.05), but the Barthel index in the study group after 1 month and 2 months of nursing was found to be significantly higher than that in the control group (P < 0.05).

Comparison NSE and MBP levels after nursing in the two groups

With regard to NSE and MBP, the patients in the study group after nursing outperformed the control group (P < 0.05). See Figure 2.

Comparison of clinical efficacy between the two groups

The total clinical efficiency of the study group was significantly higher than that of the control group (P < 0.05, Table 3).

Comparison of wake time between the two groups

Figure 3 shows that the wake time of patients in the study group was significantly shorter than that of the control group (P < 0.05).

Discussion

As an important place for hospitals to rescue patients, the clinical nursing of operating room needs to be completed jointly by multiple medical personnel, and the quality of nursing directly affects the life safety of patients [12, 13]. STBI patients often exhibit different degrees of consciousness disorders during the coma period, so effective nursing mode is of great significance for improving the recovery rate and reducing the fatality rate of STBI patients. Early
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Rehabilitation training for STBI coma patients is conductive to reducing and preventing secondary injuries caused by long-term bed rest, reducing the occurrence of misuse syndrome, and promoting the rehabilitation of body and language functions [14-16]. Studies have found that NSE and MBP are important serum markers of central nerve injury in human body, among which NSE is an important alcohol enzyme that exists in a large number of nerve tissues and neuroendocrine tissues, and has the highest activity in brain cells. To our knowledge, tumor and brain injury can cause high level of NSE expression. MBP is a substance containing a variety of basic amino acids, which can maintain the stability of the central nervous system. When the central nervous system is injured, the blood-brain barrier permeability changes and a large amount of MBP flows into the blood vessels, which becomes an important marker for the identification of brain injury diseases [17]. In this study, the seamless nursing mode between operating room and ward was implemented for STBI coma patients. Additionally, according to the clinical manifestations, targeted early rehabilitation training program was formulated to improve patients’ degree of coma. Of note, the NSE and MBP of the patients in the study group after nursing were superior to those of the control group (P < 0.001), suggesting that the seamless nursing mode is credited for the better recovery of the central nervous system of STBI patients and the shorter recovery time.

The prior study has pointed out that the seamless nursing mode enables the limb motor function of patients with traumatic brain injury to recover to the maximum extent and reduce the occurrence of disuse syndrome. Furthermore, rehabilitation training, such as music awakening and cold and hot thorn awakening, can stimulate the cerebral cortex of coma patients to generate new excitatory lesions, affecting brain activity. Nerve stimulation can increase blood flow in multiple areas of the brain, accelerate consciousness recovery, and improve clinical symptoms [18, 19]. It is known that GCS score is an important indicator for medical evaluation of the degree of coma patients. In this study, we observed that with all-round nursing, the degree of coma of patients after intervention was greatly improved. It is in conformity with the research of Diz et al. [20] wherein patients with cerebral hemorrhage were given a seamless nursing model, and the GCS score of the patients after intervention was 12.07±1.94 points, which was significantly higher than the 9.03±1.75 points of the control group, suggesting that the seamless nursing model benefits the degree of coma of patients with intracranial diseases and promotes the recovery of consciousness. Importantly, the seamless nursing model can also improve the professional quali-
ty of nursing staff, enhance the coordination ability of all departments, and shorten the treatment time [21]. Biased results might be yielded since we included a small sample size and failed to conduct long-term follow-up. Therefore, further study will be needed to draw definite conclusions.

To sum up, the results from the current study suggest that seamless nursing mode between operating room and ward is able to decrease the degree of coma of STBI patients, shorten the waking time, and improve the ability of daily activities.

Disclosure of conflict of interest
None.

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References

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