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Original Article

Effect of intermittent oro-esophageal tube feeding combined with continuous nursing intervention on patients with intracerebral hemorrhage after surgery

Naihui Yang[1,2*], Dingfen Wu[2*], Jian Zhou[3], Yiping Yin[4], Qing Guo[2], Xiaoli Feng[5], Hong Qi[6]

[1]School of Nursing, Chengdu Medical College, Chengdu 610083, Sichuan, China; [2]Department of Critical Care Medicine, The Third People's Hospital of Yibin, Yibin 644000, Sichuan, China; [3]Department of Rheumatology, The First Affiliated Hospital of Chengdu Medical College, Chengdu 610500, Sichuan, China; [4]Department of Neurology, The Third People's Hospital of Yibin, Yibin 644000, Sichuan, China; [5]Department of Respiratory and Critical Care Medicine, The First Affiliated Hospital, School of Clinical Medicine, Chengdu Medical College, Chengdu 610500, Sichuan, China; [6]Clinical Medical College and The First Affiliated Hospital of Chengdu Medical College, Chengdu, China. [*]Equal contributors and co-first authors.

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Abstract: Objectives: To explore the impact of intermittent oro-esophageal tube feeding combined with continuous nursing intervention on postoperative recovery in patients with intracerebral hemorrhage. Methods: A retrospective study was conducted on 212 patients with intracerebral hemorrhage after surgery who were admitted to the Third People's Hospital of Yibin from January 2022 to December 2023. Patients were divided into two groups: the control group (108 patients), who received intermittent oro-esophageal tube feeding, and the observation group (104 patients), who received intermittent oro-esophageal tube feeding combined with continuous nursing intervention. Clinical data, National Institutes of Health Stroke Scale (NIHSS), Glasgow Coma Scale (GCS), and the Activity of Daily Living (ADL) scores, psychological status, nutritional indices (albumin, hemoglobin, transferrin), compliance, and nursing satisfaction were compared between the groups. Results: Post-intervention, the observation group had significantly lower NIHSS scores and higher GCS, hemoglobin, albumin, transferrin, and ADL scores compared to the control group (all $P < 0.05$). Additionally, ESCA scores in the observation group were significantly higher than those in the control group ($P < 0.05$). Nursing satisfaction in the observation group was 97.12%, compared to 83.3% in the control group ($P = 0.033$). Conclusion: Intermittent oro-esophageal tube feeding combined with continuous nursing intervention improves neurological deficits, reduces brain injury, and promotes recovery of motor function and daily living abilities in patients with intracerebral hemorrhage after surgery.

Keywords: Intermittent oro-esophageal tube feeding, continuous nursing intervention, intracerebral hemorrhage after surgery

Introduction

Intracerebral hemorrhage is a common acute cerebrovascular disease characterized by sudden onset, rapid progression, and high rates of disability and fatality [1]. According to recent statistics, the global incidence of intracerebral hemorrhage ranges from 10 to 30 per 100,000 individuals [2, 3]. Currently, surgical intervention remains the primary treatment for patients with intracerebral hemorrhage [4]. Postoperative patients often experience increased energy expenditure, significant muscle tissue breakdown, impaired gastrointestinal function, and reduced self-care ability [5]. Moreover, some patients present with consciousness disorders, rendering them unable to eat or perform daily activities independently.

Research by Cai et al. indicates that malnutrition in patients with acute ischemic stroke is associated with poor prognosis three months after onset [6]. With advancements in modern medicine, the importance of providing nutritional support to patients with hypertensive cerebral hemorrhage has been increasingly recog-

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nized. Such support improves patients' nutritional status, facilitating recovery and disease management [7, 8].

Currently, indwelling gastric tube feeding is the predominant feeding method used during hospitalization for postoperative intracerebral hemorrhage patients [9]. Although this method ensures adequate short-term nutritional intake, prolonged use is associated with complications such as aspiration pneumonia, mucosal damage, reduced comfort, diminished self-esteem, and inconvenience in daily activities [10]. Improper care may result in wound infections, tube obstruction, and even the need for reoperation, thereby increasing patient discomfort and risks. Furthermore, this approach has a relatively high risk of reflux and aspiration pneumonia [11].

In contrast, intermittent tube feeding offers greater comfort and fewer complications while promoting the recovery of swallowing function [12]. However, improper nursing during intermittent feeding may still pose risks, including aspiration pneumonia, aspiration, and, in severe cases, sudden death.

Continuous nursing intervention is a comprehensive care model that extends beyond acute hospital care. It emphasizes ongoing support and follow-up for patients in various settings and time periods [13]. This approach provides continuous health services, promotes patient recovery, reduces treatment costs, and alleviates the psychological and financial burdens on patients and their families [14]. In chronic disease management, continuous nursing intervention has been shown to benefit patients with conditions such as diabetes, hypertension, and heart disease by improving symptom control, treatment adherence, and reducing complications [15]. Through individualized care plans, regular follow-up, and patient education on medication, lifestyle adjustments, and self-care skills, this model ensures better outcomes [16].

Despite its success in managing chronic diseases, there are no reports on the clinical application of continuous nursing intervention for patients with intracerebral hemorrhage after surgery. Thus, its efficacy in this context remains unclear.

This study aims to evaluate the impact of intermittent oro-esophageal tube feeding combined with continuous nursing intervention on patients with intracerebral hemorrhage after surgery. The goal is to mitigate negative emotions, enhance self-care abilities, and improve the quality of life for this patient population.

Methods

Study design

This retrospective study selected 212 patients with postoperative intracerebral hemorrhage from The Third People's Hospital of Yibin, from January 2022 to December 2023, who met the inclusion criteria. Of these, 108 patients who received intermittent oro-esophageal tube feeding were assigned to the control group, while 104 patients who received intermittent oro-esophageal tube feeding combined with continuous nursing intervention were assigned to the observation group. The study was approved by the Ethics Committee of The Third People's Hospital of Yibin.

Inclusion and exclusion criteria

Inclusion criteria: (1) Diagnosis of intracerebral hemorrhage based on established criteria [17], with subsequent surgical treatment. (2) Age ≥ 18 years. (3) Clear consciousness at discharge following surgery.

Exclusion criteria: (1) Critically ill patients unable to perform activities of daily living. (2) Patients with cognitive impairment or language communication barriers. (3) Non-compliant patients or those expressing a desire to withdraw from the study. (4) Patients with severe diseases of the heart, lungs, liver, kidneys, or other organs, as well as blood or endocrine system disorders.

Methods

Patients in the control group received intermittent oro-esophageal tube feeding. The patient was placed in a semi-recumbent position, with the head elevated and the chin brought toward the sternum to open the mouth. The oro-esophageal tube was inserted slowly into the oral cavity, ensuring it entered the esophagus. If the tube curled in the mouth, it was repositioned. Once the tube was properly inserted, the head

was relaxed and secured. If the patient had difficulty opening the mouth, a dental pad was used to assist. The insertion was considered successful if: (1) Rotating the tube clockwise and counterclockwise did not elicit a cough (which would indicate possible tracheal insertion). (2) The distal end of the tube was placed in water and no bubbles were observed, confirming the correct placement in the esophagus. Once the tube was successfully inserted, feeding (including high-protein purees, enteral nutrition, fruit juices, and water) was performed. The tube was removed after feeding. Tube placement was performed three times daily, with each feeding consisting of 400-500 mL of food and 200 mL of water every 4 hours.

Patients in the observation group received the same intermittent oro-esophageal tube feeding as the control group, combined with continuous nursing intervention. Continuous nursing intervention included the following components: (1) Follow-up: Medical staff provided follow-up via phone for the first 4 weeks after discharge, then monthly follow-up for the subsequent 6 months. This allowed for continuous tracking of the patient's condition. (2) Health Education: Patients and families were educated on intracerebral hemorrhage treatment, management of complications, and when to seek medical attention. Special emphasis was placed on maintaining a calm environment for hypertensive intracerebral hemorrhage patients. (3) Medication Guidance: Tailored advice on medication dosages and types was provided, promoting adherence to prescribed regimens and highlighting the risks of non-compliance. (4) Diet Management: Patients and their families were instructed on a balanced, light, low-salt, low-fat diet rich in vitamins and proteins. (5) Rehabilitation Exercises: Based on the patient's recovery stage, appropriate physical activities were encouraged. As the patient regained mobility, family members were trained to assist with daily exercises to enhance self-care. For hypertensive cerebral hemorrhage patients, excessive physical exertion was avoided, and support from family members was recommended when necessary. (6) Self-Monitoring: Patients were reminded to regularly measure their blood pressure, guided on medication, exercise, and diet, and provided with coping strategies for abnormal blood pressure readings. (7) Speech Therapy: Medical staff provided mouth exercises, pronunciation guidance, and supported patient-family communication. Incorrect pronunciation was corrected as needed. The intervention period lasted for 6 months, with follow-up conducted in the first 4 weeks post-discharge.

Observation indicators

The primary indicators included cognitive function, self-care ability, and quality of life. Neurological function was evaluated using the National Institutes of Health Stroke Scale (NIHSS) [18], Glasgow Coma Scale (GCS) [19], and the Activity of Daily Living Scale (ADL) [20]. The NIHSS has a total score of 42, with higher scores indicating more severe neurological impairment. The GCS has a total score of 15, with higher scores indicating a lower degree of coma. The ADL has a total score of 100, with higher scores reflecting better functional ability. The Self-Care Ability Assessment Scale, adapted by Kazawa K et al. [21], was used to assess self-care ability in intracerebral hemorrhage (ICH) patients. This scale includes four dimensions: ICH-related knowledge, self-care skills, self-care responsibility, and rehabilitation knowledge. Each dimension is scored out of 100, with lower scores indicating poorer self-care ability.

Secondary indicators included general clinical characteristics, coagulation markers (Prothrombin Time [PT] and Activated Partial Thromboplastin Time [APTT]), nursing satisfaction, postoperative complications, nutritional status, and negative psychological conditions. Nursing satisfaction was assessed using a self-developed scale [22], which includes 22 items with a total score of 110. Nutritional status was assessed by measuring albumin (ALB), hemoglobin (Hb), and transferrin (TRF) before and one month after intervention. Blood samples (2-3 mL) were collected after fasting, both before and one month after intervention. After centrifugation at 3,000 rpm, serum was separated and used for enzyme-linked immunosorbent assay (ELISA). Negative psychological conditions were evaluated using the Self-Rating Anxiety Scale (SAS) [23] and the Hamilton Anxiety Rating Scale (HAMA) [24]. SAS was used for subjective assessment, while HAMA was used for objective assessment. The SAS scores were interpreted as follows: ① No anxi-

ety: < 40 points; ② Mild anxiety: 40-47 points; ③ Moderate anxiety: 48-55 points; ④ Severe anxiety: > 56 points. The HAMA contains 14 items assessing anxiety-related symptoms such as mood, tension, fear, insomnia, and somatic anxiety. Each item is scored from 0 (no symptom) to 4 (extremely severe), with higher total scores indicating more severe anxiety.

Statistical analysis

Statistical analysis was performed using SPSS 26.0 software. Count data were presented as means (standard deviations) or quantiles. For homogeneous variance, paired t-tests were used for intra-group comparisons, and one-way ANOVA was used for inter-group comparisons. For non-homogeneous variance, Wilcoxon signed-rank sum tests were used for intra-group comparisons, and Kruskal-Wallis rank sum tests for inter-group comparisons. For pairwise comparisons, LSD-t tests were applied. A significance level of $\alpha = 0.05$ was set, and $P < 0.05$ was considered statistically significant.

Results

Comparison of general characteristics between the two groups

In the observation group, there were 54 males and 50 females, aged 20 to 75 years, with a mean age of 63.39 ± 0.82 years. In the control group, there were 50 males and 58 females, aged 19 to 79 years, with a mean age of 63.37 ± 0.83 years. There were no significant differences between the two groups in terms of age, gender, marital status, education level, per capita household income, fee payment method, primary caregivers, hospitalization time, smoking history, past medical history, alcohol consumption, main symptoms, time from onset to surgery, bleeding volume, or bleeding location (all $P > 0.05$) (**Table 1**).

Comparison of cognitive function between the two groups

Before the intervention, there were no significant differences in NIHSS, GCS, and ADL scores between the two groups (all $P > 0.05$). After the intervention, the NIHSS score in the observation group was lower than that in the control group, while the GCS and ADL scores were higher in the observation group. All differences were statistically significant ($P < 0.05$) (**Figure 1**).

Comparison of coagulation indicators between the two groups

There was no significant difference in PT between the control and observation groups before the intervention (control-pre: 10.49 ± 1.31; observation-pre: 10.56 ± 1.42, $P = 0.730$). After the intervention, PT was significantly different between the two groups (control: 9.84 ± 1.19; observation: 8.83 ± 1.15, $P < 0.001$). Pre-intervention APTT was 22.43 ± 3.24 seconds for the control group and 22.42 ± 3.00 seconds for the observation group, with no significant difference ($P = 0.977$). After the intervention, APTT was significantly different between the two groups (control: 14.04 ± 1.75; observation: 13.55 ± 1.35, $P = 0.025$) (**Table 2**).

Comparison of ESCA scores between the two groups

The observation group had higher ESCA scores than the control group ($P < 0.05$), indicating that intermittent oro-esophageal tube feeding combined with continuous nursing intervention improved patients' self-care ability (**Table 3**).

Comparison of nursing satisfaction and post-operative complication rates between the two groups

After the nursing intervention, the nursing satisfaction in the observation group was 97.12%, compared to 83.30% in the control group, with a significant difference between the groups ($P = 0.033$) (**Table 4**). The occurrence of complications, such as pressure sores, lower extremity venous thrombosis, and infections, was lower in the observation group ($P < 0.05$). The complication rate in the observation group was 6.72%, significantly lower than the 37.04% in the control group ($P < 0.05$) (**Table 4**).

Comparison of nutritional indicators between the two groups

After the intervention, the hemoglobin level in the observation group was 137.85 ± 5.80 g/L, compared to 121.48 ± 5.23 g/L in the control group, with a significant difference ($P < 0.001$).

Table 1. Comparison of general characteristics between the two groups

Group	Observation group (n = 104)	Control group (n = 108)	χ^2/t	P
Gender			0.671	0.413
Male	54 (51.92%)	50 (46.30%)		
Female	50 (48.08%)	58 (53.70%)		
Age	63.39 ± 0.82	63.37 ± 0.83	0.211	0.833
Marital status			0.008	0.929
Married	94 (90.38%)	98 (90.7%)		
Other	10 (9.62%)	10 (9.3%)		
Degree of education			0.208	0.976
Illiteracy	28 (26.92%)	31 (28.70%)		
Primary school	42 (40.39%)	42 (38.89%)		
Junior high school	21 (20.19%)	23 (21.30%)		
University	13 (12.50%)	12 (11.11%)		
Per capita household income (Months)			0.922	0.820
< 1000 Yuan	24 (23.07%)	21 (19.44%)		
100-2000 Yuan	36 (34.62%)	35 (32.41%)		
2000-3000 Yuan	23 (22.12%)	29 (26.85%)		
< 3000 Yuan	21 (20.19%)	23 (21.30%)		
Fee payment method			0.317	0.854
Self-funded	4 (3.84%)	3 (2.78%)		
Employee medical insurance	24 (23.07%)	23 (21.30%)		
Resident medical insurance	76 (73.09%)	82 (75.93%)		
Primary caregivers			2.003	0.572
Spouse	82 (78.85%)	84 (77.78%)		
Children	16 (15.39%)	13 (12.04%)		
Nanny	3 (2.88%)	4 (3.70%)		
To live alone	3 (2.88%)	7 (6.48%)		
Hospitalization time			0.399	0.819
< 2 weeks	35 (33.65%)	32 (29.63%)		
2-4 weeks	42 (40.39%)	46 (42.59%)		
> 4 weeks	27 (25.96%)	30 (27.78%)		
Smoking history	42 (40.39%)	46 (42.59%)	0.106	0.744
Past medical history	86 (82.69%)	83 (76.85%)	1.118	0.290
Drinking history	55 (52.88%)	45 (41.67%)	2.675	0.102
Main symptoms			0.723	0.868
One kind	37 (35.58%)	43 (39.81%)		
Two types	35 (33.65%)	34 (31.48%)		
Three types	30 (28.85%)	30 (27.78%)		
Three types above	2 (1.92%)	1 (0.93%)		
Time from onset to surgery	5.58 ± 0.62	5.46 ± 0.56	1.455	0.147
Bleeding volume	34.68 ± 3.79	35.23 ± 3.35	1.135	0.258
Bleeding location			2.442	0.655
Frontal lobe	20 (19.23%)	15 (13.89%)		
Ventricle	27 (25.96%)	32 (29.63%)		
Basal ganglia	19 (18.27%)	18 (16.67%)		
Occipital lobe	16 (15.38%)	23 (21.30%)		
Frontal lobe	22 (21.16%)	20 (18.51%)		

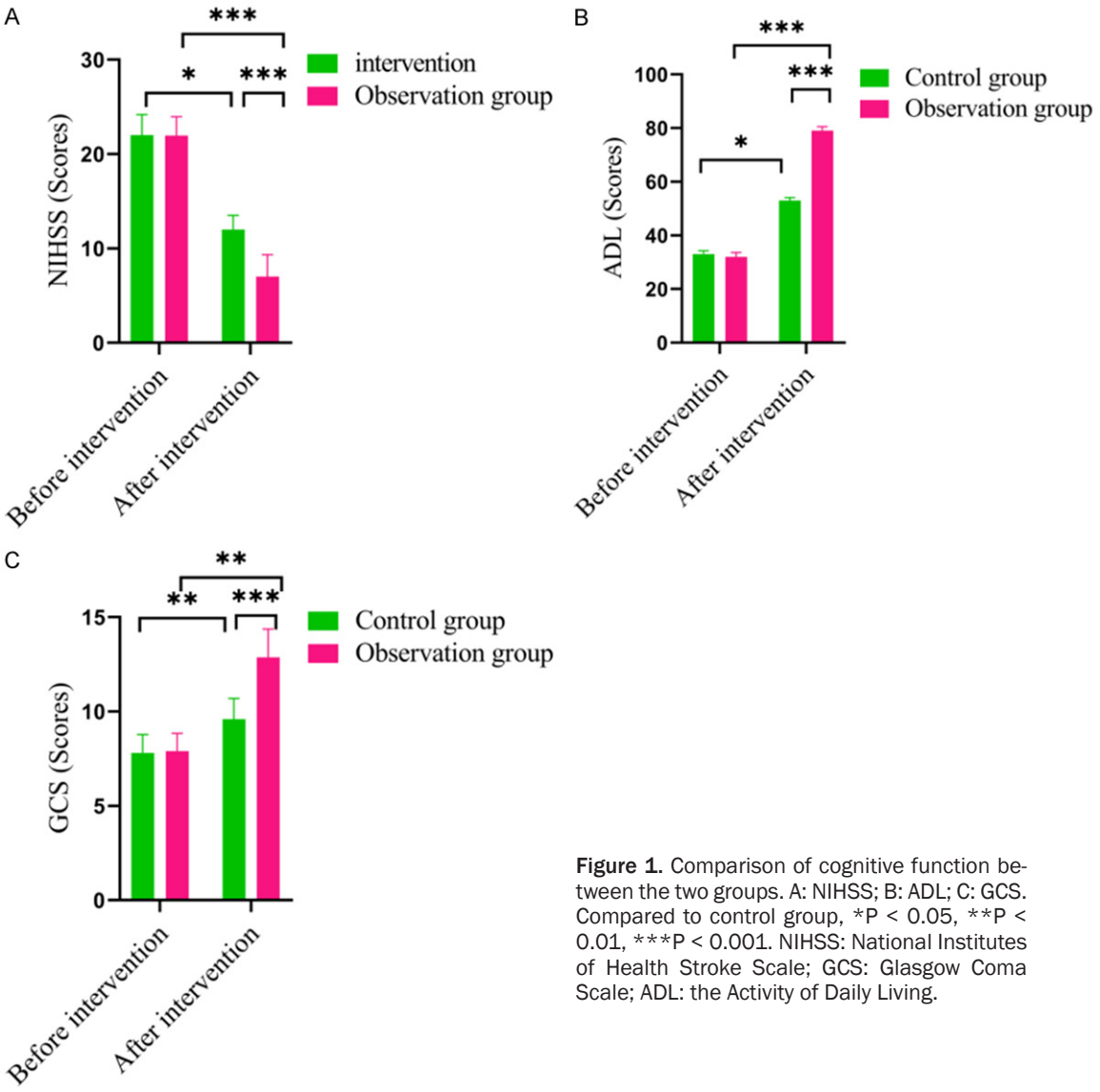

Figure 1. Comparison of cognitive function between the two groups. A: NIHSS; B: ADL; C: GCS. Compared to control group, *P < 0.05, **P < 0.01, ***P < 0.001. NIHSS: National Institutes of Health Stroke Scale; GCS: Glasgow Coma Scale; ADL: the Activity of Daily Living.

Table 2. Comparison of coagulation indicators between the two groups

Group		Observation group (n = 104)	Control group (n = 108)	t	P
PT	Before intervention	10.56 ± 1.42	10.49 ± 1.31	0.346	0.730
	After intervention	8.83 ± 1.15	9.84 ± 1.19	6.260	< 0.001
APTT	Before intervention	22.42 ± 3.00	22.43 ± 3.24	0.029	0.977
	After intervention	13.55 ± 1.35	14.04 ± 1.75	2.262	0.025

PT: Prothrombin Time; APTT: Activated Partial Thromboplastin Time.

The albumin level in the observation group was 34.11 ± 1.67 g/L, compared to 25.03 ± 4.73 g/L in the control group, with a significant difference (P < 0.001). The transferrin level in the observation group was 3.69 ± 0.18 g/L, compared to 1.89 ± 0.39 g/L in the control group, with a significant difference (P < 0.001) (**Table 5**).

Comparison of self-care ability scores between the two groups

After the intervention, the observation group had significantly higher scores in self-concept (28.70 ± 2.09 vs. 22.45 ± 3.94, P < 0.001), self-care skills (41.13 ± 2.42 vs. 25.76 ± 9.20, P < 0.001), sense of self-protection responsibil-

Table 3. Comparison of ESCA scores between the two groups

Group		Observation group (n = 104)	Control group (n = 108)	T	P
Self-concept	Before intervention	21.00 ± 1.69	20.78 ± 1.70	0.969	0.334
	After intervention	25.50 ± 2.66	22.20 ± 3.56	7.607	0.000
Health knowledge level	Before intervention	2361 ± 2.03	23.43 ± 1.86	0.661	0.509
	After intervention	4013 ± 2.34	33.53 ± 4.78	12.689	0.000
Sense of self-protection responsibility	Before intervention	14.17 ± 1.82	13.92 ± 1.66	1.024	0.307
	After intervention	19.87 ± 2.25	16.07 ± 4.38	7.902	0.000
Self care skills	Before intervention	20.97 ± 1.69	20.90 ± 1.73	0.316	0.752
	After intervention	38.43 ± 2.52	34.09 ± 4.67	8.388	0.000

Table 4. Comparison of nursing satisfaction and postoperative complication between the two groups

	Observation group (n = 104)	Control group (n = 108)	χ^2	p
Nursing satisfaction	101 (97.12%)	90 (83.3%)	6.813	0.033
Very satisfied	51 (49.04%)	54 (50.00%)		
Satisfied	50 (48.08%)	36 (33.33%)		
Dissatisfied	3 (2.88%)	18 (16.67%)		
Postoperative complication	7 (6.72%)	40 (37.04%)	28.202	0.000
Pressure ulcer	3 (2.88%)	13 (12.04%)		
Lower limb venous thrombosis	3 (2.88%)	13 (12.04%)		
Infected	1 (0.96%)	14 (12.96%)		

Table 5. Comparison of nutritional indicators between the two groups

Group	Observation group (n = 104)	Control group (n = 108)	T	P
Hemoglobin	137.85 ± 5.80	121.48 ± 5.23	21.616	< 0.001
Albumin	34.11 ± 1.67	25.03 ± 4.73	18.483	< 0.001
Transferrin	3.69 ± 0.18	1.89 ± 0.39	42.776	< 0.001

ity (24.58 ± 1.48 vs. 20.67 ± 2.48, P < 0.001), and health knowledge level (44.72 ± 1.73 vs. 33.54 ± 6.15, P < 0.001) compared to the control group, with significant differences (P < 0.001) (**Table 6**).

Comparison of negative psychology between the two groups

After the intervention, the SAS and HAMA scores were lower in both groups compared to pre-intervention levels. The improvement in negative psychological scores was significantly greater in the observation group compared to the control group (P < 0.05) (**Figure 2**).

Discussion

Patients with ICH after surgery are prone to swallowing difficulties, often experiencing symptoms such as coughing, nasal regurgitation, and other complications during eating. These issues can affect their appetite and hinder recovery. Furthermore, surgery can negatively impact the nutritional status of these patients. Appropriate nutritional support and interventions are necessary to maintain good nutritional health and promote recovery.

In our study, intermittent oro-esophageal tube feeding combined with continuous nursing intervention improved the neurological function of patients with ICH after surgery. Intermittent oral-esophageal tube feeding ensures timely nutrient supply, meeting patients' nutritional needs and providing essential energy and substances for nerve cell repair and regeneration. Adequate nutrition is crucial for the recovery of neurological function [25]. Moreover, continuous nursing plays an important role. By providing close monitoring and individualized care, it helps detect and address potential complications and issues in a timely manner, creating an optimal environment for nerve function recovery [26, 27]. This includes proper positioning, prevention of complications such as pressure sores and infections, and active rehabilitation guidance. These comprehensive measures promote blood circulation, reduce secondary dam-

Table 6. Comparison of self-care ability scores between the two groups

Group		Observation group (n = 104)	Control group (n = 108)	t	P
Self-concept	Before intervention	18.42 ± 1.49	18.34 ± 1.41	0.404	0.687
	After intervention	28.70 ± 2.09	22.45 ± 3.94	14.359	0.000
Self care skills	Before intervention	29.44 ± 1.44	29.63 ± 1.52	0.911	0.364
	After intervention	41.13 ± 2.42	25.76 ± 9.20	16.488	0.000
Sense of self-protection responsibility	Before intervention	13.56 ± 1.36	13.34 ± 1.42	1.139	0.256
	After intervention	24.58 ± 1.48	20.67 ± 2.48	13.872	0.000
Health knowledge level	Before intervention	30.85 ± 1.46	30.53 ± 1.48	1.611	0.109
	After intervention	44.72 ± 1.73	33.54 ± 6.15	17.873	0.000

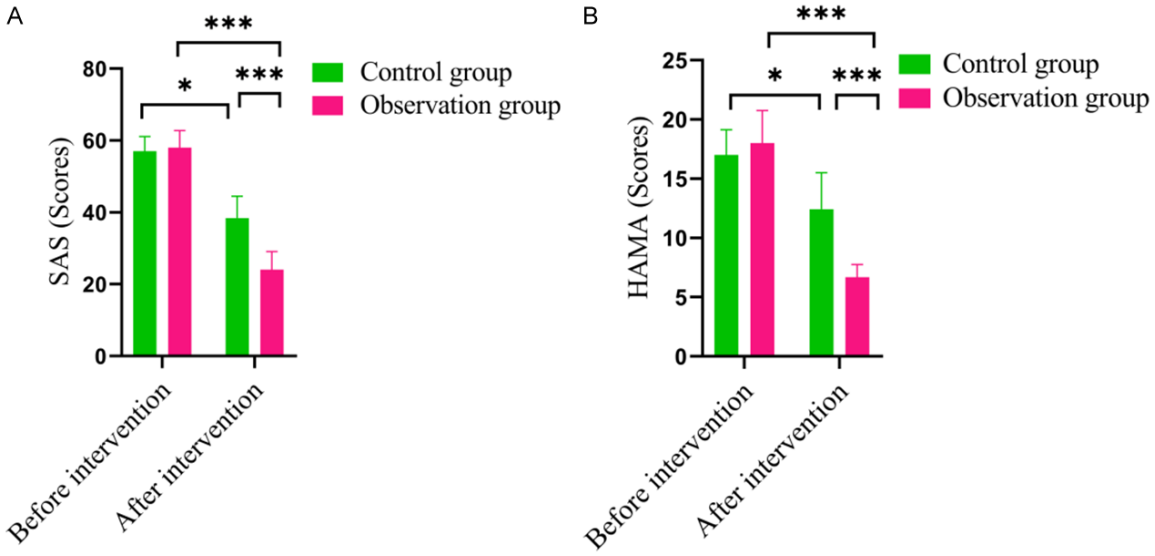

Figure 2. Comparison of negative psychology between the two groups. Note: SAS: Self-rating Anxiety Scale; HAMA: Hamilton Anxiety Scale. Compared to control group, *P < 0.05, ***P < 0.001.

age, and facilitate the restoration and improvement of nerve function in post-surgical ICH patients.

We also found that intermittent oro-esophageal tube feeding combined with continuous nursing intervention improved the self-care ability of ICH patients after surgery. Continuous nursing provides long-term, consistent follow-up and support. It involves regular visits, condition monitoring, and guidance on rehabilitation exercises, helping patients maintain continuous rehabilitation and promoting the gradual recovery of physical functions [28, 29]. In addition, it offers comprehensive health education, enhancing patients' and their families' understanding of the disease, rehabilitation methods, and daily care, encouraging active participation in the rehabilitation process and better self-management. Moreover, continuous nursing addresses the psychological state of patients by offering psychological counseling and support, helping them overcome negative emotions and build confidence, which is crucial for active participation in self-care [30]. Furthermore, it coordinates with various medical resources to ensure comprehensive, coordinated care, facilitating overall health improvement and enhancing self-care ability. Through these aspects, continuous nursing plays a vital role in enhancing the self-care ability of post-surgical ICH patients [31, 32].

Intermittent oral-esophageal tube feeding is of great significance for postoperative patients with cerebral hemorrhage. Firstly, it helps meet the nutritional needs of patients. Due to the impact of the disease and surgery, these

patients often face difficulties with normal eating. Intermittent tube feeding ensures the supply of essential nutrients, promoting recovery and enhancing the body's resistance [33]. Secondly, it is more flexible than continuous tube feeding, reducing discomfort and potential complications associated with long-term indwelling tubes [34].

Continuous nursing care is also crucial. It involves ongoing monitoring and assessment of the patient's condition, including vital signs, neurological status, and feeding tolerance [35]. Nurses can provide timely adjustments and interventions to ensure the safety and effectiveness of feeding. Additionally, they offer comprehensive care in areas such as skin care, prevention of complications, and psychological support. This continuous attention can improve the patient's comfort and quality of life, aiding in better adaptation to the postoperative recovery process [36]. Moreover, continuous nursing fosters strong communication and trust with the patient and their family, facilitating cooperation and adherence to the treatment plan [37]. That is, the combination of intermittent oral-esophageal tube feeding and continuous nursing plays a vital role in promoting rehabilitation and improving the prognosis of postoperative cerebral hemorrhage patients.

This study has some limitations. Firstly, the sample size may be relatively small, which could limit the generalizability of the findings. Secondly, the study may be restricted to a specific population or a single medical center, potentially reducing external validity. Additionally, there may be biases in patient selection or assessment methods. Moreover, the long-term effects and potential complications of this approach might not have been fully explored or evaluated. Factors such as patient compliance and the impact of individual differences on outcomes may not have been comprehensively considered. Finally, other confounding variables that could affect the results might not have been adequately controlled.

In conclusion, intermittent oro-esophageal tube feeding combined with continuous nursing intervention can improve cerebral nerve function in patients with intracerebral hemorrhage after surgery. It reduces brain injury, promotes the recovery of motor ability and activities of daily living, decreases the incidence of postoperative complications, and also facilitates the recovery of coagulation function, thereby reducing the rate of rebleeding.

Disclosure of conflict of interest

None.

Address correspondence to: Hong Qi, Clinical Medical College and The First Affiliated Hospital of Chengdu Medical College, No. 278 Middle Section of Baoguang Avenue, Xindu District, Chengdu 610500, Sichuan, China. Tel: +86-13881759007; E-mail: Yang20190123@sina.com

References

[1] Sheth KN. Spontaneous intracerebral hemorrhage. N Engl J Med 2022; 387: 1589-1596.
[2] Nardi V, Benson JC, Saba L, Bois MC, Meyer FB, Lanzino G, Lerman LO and Lerman A. Patients with carotid intraplaque hemorrhage have higher incidence of cerebral microbleeds. Curr Probl Cardiol 2023; 48: 101779.
[3] Dicpinigaitis AJ, Feldstein E, Damodara N, Cooper JB, Shapiro SD, Kamal H, Kinon MD, Pisapia J, Rosenberg J, Gandhi CD and Al-Mufti F. Development of cerebral vasospasm following traumatic intracranial hemorrhage: incidence, risk factors, and clinical outcomes. Neurosurg Focus 2022; 52: E14.
[4] Zhan Y, Zou X, Wu J, Fu L, Huang W, Lin J, Luo F and Wang W. Neuroendoscopy surgery for hypertensive intracerebral hemorrhage with concurrent brain herniation: a retrospective study of comparison with craniotomy. Front Neurol 2023; 14: 1238283.
[5] van Os HJA, Verbaan D, Ruigrok YM, Dennesen P, Müller MCA, Coert BA, Vergouwen MDI and Wermer MJH. Delayed cerebral ischemia after aneurysmal subarachnoid hemorrhage in young patients with a history of migraine. Stroke 2022; 53: 2075-2077.
[6] Cai ZM, Wu YZ, Chen HM, Feng RQ, Liao CW, Ye SL, Liu ZP, Zhang MM and Zhu BL. Being at risk of malnutrition predicts poor outcomes at 3 months in acute ischemic stroke patients. Eur J Clin Nutr 2020; 74: 796-805.
[7] Chen F, Zhang S, Li B, Zhang J, Ran M and Qi B. A review of invasive intracranial pressure monitoring following surgery for hypertensive cerebral hemorrhage. Front Neurol 2023; 14: 1108722.
[8] Sun X, Sun G, He B, Wang Z and Shi L. Application of 3D visualization technology based on hematoma edge key points setting for emergency hypertensive cerebral hemorrhage surgery in primary hospitals. J Clin Neurosci 2024; 119: 39-44.

[9] Ling C, Hu X, Chen C, Luo L, Cai M, Liang C, Wang H and Guo Y. Comparison of nutritional effectiveness and complication rate between early nasojejunal and nasogastric tube feeding in patients with an intracerebral hemorrhage. J Clin Neurosci 2022; 103: 107-111.
[10] Dubin PH, Boehme AK, Siegler JE, Shaban A, Juengling J, Albright KC and Martin-Schild S. New model for predicting surgical feeding tube placement in patients with an acute stroke event. Stroke 2013; 44: 3232-3234.
[11] Chen Y, Tian X, Liu C, Zhang L, Xv Y and Xv S. Application of visual placement of a nasojejunal indwelling feeding tube in intensive care unit patients receiving mechanical ventilation. Front Med (Lausanne) 2022; 9: 1022815.
[12] Zeng H, Zhao W, Wu J, Wei J, Li H, Wang L and Zeng X. Effect of intermittent oro-esophageal tube feeding in bulbar palsy after ischemic stroke: a randomized controlled study. Stroke 2024; 55: 1142-1150.
[13] Wang Q and Luo L. Continuous nursing intervention based on network interactive in early diabetic kidney disease patients. Diabetes Metab Syndr Obes 2023; 16: 1055-1062.
[14] Yuan L, Yuan H, Feng Q and Zhao J. Effect of continuous nursing on quality of life of hemodialysis patients: a protocol for systematic review and meta-analysis. Medicine (Baltimore) 2021; 100: e24942.
[15] Zhao G and Gao J. The effect of continuing nursing intervention on peritoneal dialysis patients and the occurrence of peritonitis: a meta-analysis. Altern Ther Health Med 2023; 29: 558-563.
[16] Søjbjerg A, Mygind A, Rasmussen SE, Christensen B, Pedersen AF, Maindal HT, Burau V and Christensen KS. Improving mental health in chronic care in general practice: study protocol for a cluster-randomised controlled trial of the Healthy Mind intervention. Trials 2024; 25: 277.
[17] Rodrigues MA, Samarasekera N, Lerpiniere C, Humphreys C, McCarron MO, White PM, Nicoll JAR, Sudlow CLM, Cordonnier C, Wardlaw JM, Smith C and Al-Shahi Salman R. The Edinburgh CT and genetic diagnostic criteria for lobar intracerebral haemorrhage associated with cerebral amyloid angiopathy: model development and diagnostic test accuracy study. Lancet Neurol 2018; 17: 232-240.
[18] Guterud M, Fagerheim Bugge H, Røislien J, Kramer-Johansen J, Toft M, Ihle-Hansen H, Bache KG, Larsen K, Braarud AC, Sandset EC and Ranhoff Hov M. Prehospital screening of acute stroke with the National Institutes of Health Stroke Scale (ParaNASPP): a stepped-wedge, cluster-randomised controlled trial. Lancet Neurol 2023; 22: 800-811.
[19] Brennan PM, Whittingham C, Sinha VD and Teasdale G. Assessment of level of consciousness using Glasgow Coma Scale tools. BMJ 2024; 384: e077538.
[20] Puzzi VC, Oliveira JM, Alves TB, Silva JPDC, Pedroso A and Furlanetto KC. Reliability and validity of the London Chest Activity of Daily Living scale for adults with asthma. J Asthma 2024; 61: 1-9.
[21] Kazawa K, Mochizuki M, Ochikubo H and Ishii S. Development, reliability, and validity of a self-assessment scale for dementia care management. Psychogeriatrics 2023; 23: 345-353.
[22] Assumpção A, Pagano T, Matsutani LA, Ferreira EA, Pereira CA and Marques AP. Quality of life and discriminating power of two questionnaires in fibromyalgia patients: fibromyalgia impact questionnaire and medical outcomes study 36-item short-form health survey. Rev Bras Fisioter 2010; 14: 284-289.
[23] Dunstan DA and Scott N. Norms for Zung's self-rating anxiety scale. BMC Psychiatry 2020; 20: 90.
[24] Rabinowitz J, Williams JBW, Hefting N, Anderson A, Brown B, Fu DJ, Kadriu B, Kott A, Mahableshwarkar A, Sedway J, Williamson D, Yavorsky C and Schooler NR. Consistency checks to improve measurement with the Hamilton Rating Scale for Anxiety (HAM-A). J Affect Disord 2023; 325: 429-436.
[25] Wang X, Wang X, Bai H, Zhang Y and Si J. Effect of programmed nursing combined with cognitive behavioral intervention on clinical nursing effect and neurological function of patients with intracerebral hemorrhage. Am J Transl Res 2021; 13: 11728-11736.
[26] Lin H, Xu A, Wu H, Xu H, Lu Y and Yang H. Effect of proprioception and balance training combined with continuous nursing on BBS score and HSS score of patients undergoing total knee arthroplasty. Comput Math Methods Med 2022; 2022: 7074525.
[27] Zhang L, Ma Y, Liu J, Cai M and Zheng W. The effect of extended continuous nursing strategy applied to patients with mild brain injury on their quality of life and self-efficacy. Front Surg 2022; 9: 981191.
[28] Chun YM, Chun MH, Do KH and Choi SJ. Clinical predictors of oro-esophageal tube feeding success in brain injury patients with dysphagia. Ann Rehabil Med 2017; 41: 769-775.
[29] Carollo MF, Patrício TD, Montibeller CG and Luchesi KF. Tube feeding predictors after ischemic hemispheric stroke during hospitalization. Logoped Phoniatr Vocol 2022; 47: 171-176.

[30] Liu X, Zhang P, Guo C, Xu J and Hu M. Effect of rehabilitation therapy and nursing intervention on postoperative recovery of patients with hypertensive intracerebral hemorrhage. Exp Ther Med 2019; 17: 4598-4604.
[31] Zheng P, Wang J, Ma Y, Xu J and Zhu Q. Analysis of the effect of cluster nursing in postoperative hypertensive cerebral hemorrhage. J Healthc Eng 2021; 2021: 3448979.
[32] Zhang L, Shen T, Zhou Y, Xie X, Wang J and Gao H. Multidisciplinary management based on clinical nursing pathway model for the treatment of hypertensive intracerebral hemorrhage: a randomized controlled trial. Medicine (Baltimore) 2024; 103: e37644.
[33] Zeng H, Zeng X, Xiong N, Wang L, Yang Y, Wang L, Li H and Zhao W. How stroke-related dysphagia relates to quality of life: the mediating role of nutritional status and psychological disorders, and the moderating effect of enteral nutrition mode. Front Nutr 2024; 11: 1339694.
[34] Kang S, Lee SJ, Park MK, Choi E and Lee S. The therapeutic effect and complications of oro-esophageal tube training in stroke patients. Clin Interv Aging 2019; 14: 1255-1264.
[35] Huang J, Zuo J, Tang X, Zou J, Zeng Y, Chen S and He G. Early rehabilitation and nursing intervention (ERNI) accelerates the recovery of patients with ischemic stroke. Neurologist 2023; 28: 409-412.
[36] Hong Y, Yan H, Wurichayihu and Zhang G. The effects of comprehensive nursing interventions on the negative emotions, quality of life, and nursing satisfaction in intracerebral hemorrhage patients. Am J Transl Res 2021; 13: 4860-4867.
[37] Jiang J, Qu X, Wang H, Zhang C, Deng Q, Xu X, Qiu L and Yi Y. Bilateral simultaneous basal ganglia hemorrhage: a case report. Am J Case Rep 2024; 25: e943174.