*Original Article*
# Effect of holistic rehabilitation nursing on postoperative neurological function recovery and limb function improvement in patients with intraintracerebral hemorrhage

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**Abstract:** Objective: The aim of this study was to explore the effect of holistic rehabilitation nursing on postoperative neurological functional recovery and limb function improvement in patients with intraintracerebral hemorrhage (ICH). Methods: One hundred and twelve patients with ICH treated in our hospital were divided into the observation group (n=56) for holistic rehabilitation nursing and the control group (n=56) for routine nursing by a random number table. The neurological function [the National Institutes of Health Stroke Scale (NIHSS)], limb function (Fugl Meyer Assessment, FMA), psychological state (Hamilton Anxiety/Depression Scale, HAMA/HAMD), activities of daily living (ADL score) and nursing satisfaction were compared between the two groups. Results: After two weeks of intervention, NIHSS, HAMA, HAMD and ADL scores all decreased in the two groups, and were even lower in the observation group (all P<0.05); the scores of FMA and Simple Test for Evaluating hand Function (STEF) increased, and the scores were higher in the observation group as compared to the control group (both P<0.05). The nursing satisfaction of patients in the observation group was higher than that in the control group (P<0.05). Conclusion: Holistic rehabilitation nursing intervention is more conducive to the recovery of postoperative neurological function and limb function improvement in patients with ICH, and meanwhile, it can alleviate the adverse psychological mood of patients and significantly improve their activities of daily living after operation.

**Keywords:** Intracerebral hemorrhage, holistic rehabilitation nursing, neurological function, limb function

## Introduction

Intraintracerebral hemorrhage (ICH), a clinically common severe acute disease, is mainly induced by hypertension, with rapid onset, resulting in dangerous conditions, high disability and mortality [1]. With the aggravation of population aging in China, an increasing number of people are inflicted with ICH, which directly threatens the life and health of middle-aged and elderly people [2]. At the present stage, surgery is the mainstay of treatment for patients with ICH; however, long operation time and high risk it can easily lead to various complications, which adversely affects the postoperative recovery of patients [3]. Evidence has shown that high-quality perioperative nursing can promote the postoperative recovery of various physical functions of patients [4].

Traditional nursing focuses more for the care of the disease itself and the prevention of complications, while it typically pays far too little attention to psychological and physiological needs of patients [5]. On the other hand, holistic rehabilitation nursing is a high-quality and efficient care model for patients, under the guidance of modern nursing concepts, which integrates psychological, spiritual and physiological factors [6]. Yang et al. pointed out that holistic rehabilitation nursing can effectively promote postoperative rehabilitation of patients with pelvic fracture and reduce complications [7]. Currently, there is no research elucidating the application value of this nursing model in patients with ICH. Accordingly, this study mainly discusses the effect of holistic rehabilitation nursing on postoperative neurological function

recovery and limb function improvement of patients with ICH.

**Materials and methods**

*General information*

In this prospective study, 112 patients with ICH treated in our hospital from December 2018 to June 2020 were divided into the observation group for holistic rehabilitation nursing and the control group for routine nursing by a random number table method, with 56 cases in each group. All the patients or family members of the enrolled participants understood the purpose of this study and signed the informed consent, and this study was approved by the Medical Ethics Committee of our hospital. Inclusion criteria: All the patients (age range 45-75 years) were diagnosed with ICH by magnetic resonance imaging (MRI) or computed tomography (CT), with the first onset (within 6 hours from onset to admission), hospitalization time >2 weeks and patients had elective minimally invasive surgery. Exclusion criteria: Patients who were unsuitable for surgery or had surgical contraindications; Patients with brain malignancies; Patients with traumatic ICH; Patients with epilepsy or mental illness; Patients with other serious diseases that needed surgical treatment; Patients participating in other studies or those who could not cooperate with this study.

*Methods*

The control group was treated with routine nursing [8], such as active treatment of primary disease and control of elevated blood pressure and blood glucose. Mannitol was used to reduce intracranial pressure of patients. Preoperatively, 8 h of fasting and 6 h of water deprivation were carried out for operation preparation. Antibiotics were routinely used to prevent infection 30 min before and after surgery. Postoperatively, the patient was instructed to turn his head to one side and keep the respiratory tract unobstructed. The drainage tube and catheter were routinely placed and removed 5-6 days after operation, and complications were actively prevented.

The observation group received holistic rehabilitation nursing intervention measures [9]: (1) Psychological intervention: The nursing staff

evaluated the psychological state of patients and gave targeted psychological counseling according to any psychological fluctuations. Besides, the nursing staff comforted the patients, encouraged them to actively express their inner feelings, and patiently listened to their statements and gave comfort. As such, the patients' trust in the nursing staff was enhanced, and their bad emotions were relieved. What's more, the nursing staff told patients about previous successful treatment and good recovery of patients, so as to enhance their confidence in overcoming diseases and alleviate their unhealthy psychological state. (2) Limb activity intervention: According to the patient's disease recovery after surgery, the patient was informed to properly carry out active and passive training in bed during the stable period. Through high leg lifting, lower limb straightening, turning over, sitting and standing, the muscle tension of patients can be reduced, thus avoiding muscle atrophy caused by reduced activity, and effectively preventing deep vein thrombosis of the lower limbs. As the patient's body recovers, he/she can get out of bed for bedside training, such as walking and crouching, so as to promote the recovery of his/her limb function. (3) Activities of daily living training: In the convalescence period of the disease, patients were encouraged to gradually carry out daily life activities such as eating, undressing, defecation and oral washing based on their tolerance, but with care to not be too hasty. In addition, the nursing staff instructed the patients to use the healthy limbs to drive the affected limbs to move, so as to restore the coordination of bilateral limbs.

*Outcome measures*

*Primary outcome measures:* The following scales were examined before and 2 weeks after intervention, and were filled out by patients and collected on the spot, with a recovery rate of 100%.

Neurological function: The National Institutes of Health Stroke Scale (NIHSS) [10] was used to evaluate the patient's neurological function, including level of consciousness (6 points), best gaze (4 points), facial palsy (2 points), best language (6 points), motor arm (6 points), manual muscle strength (6 points), motor leg (6 points) and walking ability (6 points), with a

**Table 1.** Baseline data of patients in the two groups ($\bar{x} \pm sd$)

| Indicators | Observation group (n=56) | Control group (n=56) | $\chi^2$/t | P |
|---|---|---|---|---|
| Gender (n) | | | 0.893 | 0.345 |
|    Male | 30 | 25 | | |
|    Female | 26 | 31 | | |
| Age (years) | 59.9±5.6 | 60.3±6.3 | 0.355 | 0.723 |
| BMI (kg/m$^2$) | 22.22±1.94 | 22.47±2.10 | 0.654 | 0.514 |
| High blood pressure (n) | | | 0.527 | 0.468 |
|    Yes | 47 | 44 | | |
|    No | 9 | 12 | | |
| Smoking history (n) | | | 0.983 | 0.321 |
|    Yes | 22 | 17 | | |
|    No | 34 | 39 | | |
| Alcohol (n) | | | 0.148 | 0.701 |
|    Yes | 24 | 22 | | |
|    No | 32 | 34 | | |
| Education level (n) | | | 0.419 | 0.518 |
|    Junior high school and below | 40 | 43 | | |
|    Senior high school and above | 16 | 13 | | |

total of 42 points. The degree of neurological impairment increased with the score.

Upper limb function: The patients' upper limb function was evaluated by the simplified Fugel-Meyer Assessment (FMA, 66 points) [11] and the Simple Test for Evaluating hand Function (STEF, 100 points) [12]. The FMA covers reflex activity, flexor coordinated movement, extensor coordinated movement, activities with coordinated movement, activities without coordinated movement, hyperreflexia, wrist stability and fingers, with a total of 66 points. The STEF includes big ball, middle ball, big wooden square, middle wooden square, small wooden square, artificial leather, metal disc, metal stick, etc., with a total score of 100 points. Upper limb function improves with the increase of FMA and STEF scores.

*Secondary outcome measures:* (1) The psychological status of patients was evaluated by the Hamilton anxiety/Depression scale (HAMA/HAMD) [13, 14]. Patients with a HAMA score ≥ 7 points may be accompanied by anxiety, and those with a HAMD score ranging from 7 to 17 points may be accompanied by depressive symptoms. The higher the score, the more serious the degree of anxiety and depression. (2) The Activities of daily living (ADL) scale was

employed to evaluate the activities of daily living of patients in the two groups, including the Physical Self-Maintenance Scale (PSMS, 24 points) and the Instrumental Activity of Daily Living Scale (IADL, 32 points) [15]. The lower the score, the stronger the activities of daily living. (3) A satisfaction questionnaire made by our hospital was used to record patients' satisfaction with nursing. Satisfaction = (satisfied + generally satisfied) cases/total cases × 100%.

*Statistical analysis*

SPSS 20.0 was used for data statistics. The counting data were recorded as (n/%) and analyzed by $\chi^2$ test. The measurement data were expressed as mean ± SD; paired T test was used for comparisons before and after intervention in the same group, and independent t test was used for comparisons between two groups. The level of significance was set at P<0.05.

**Results**

*Baseline data*

There was no significant difference in general data between the two groups (all P>0.05), indicating the comparability of the two groups (**Table 1**).

*Neurological function (NIHSS score)*

Before intervention, there was no significant difference in NIHSS scores between the two groups (P>0.05). After 2 weeks of intervention, NIHSS scores decreased in both groups, and were even lower in the observation group (P<0.05; **Table 2**).

*Upper limb function (FMA and STEF scores)*

There was no significant difference in FMA and STEF scores between the two groups before intervention (both P>0.05). After two weeks of

**Table 2.** NIHSS scores before and after intervention in the two groups ($\bar{x} \pm$ sd, points)

| Group | Time | NIHSS scores |
|---|---|---|
| Observation group (n=56) | Before the intervention | 28.69±4.48 |
| | Intervention in 2 weeks | 16.55±4.22*,# |
| Control group (n=56) | Before the intervention | 28.04±3.95 |
| | Intervention in 2 weeks | 19.30±4.03* |

Note: NIHSS: National Institutes of Health Stroke Scale. Compared with before intervention, *P<0.05; compared with Control group, #P<0.05.

intervention, the scores of FMA and STEF increased in both groups, and were higher in the observation group as compared to the control group (both P<0.05; **Table 3**).

*Psychological state*

Before intervention, there was no significant difference in HAMA and HAMD scores between the two groups (both P>0.05). After two weeks of intervention, HAMA and HAMD scores decreased in both groups, with lower scores in the observation group (both P<0.05; **Table 4**).

*Activities of daily living (ADL score)*

Before intervention, there was no significant difference in PSMS, IADL and total ADL scores between the two groups (all P>0.05). After two weeks of intervention, PSMS and IADL scores as well as total ADL scores decreased in both groups, and were even lower in the observation group (all P<0.05; **Table 5**).

*Nursing satisfaction*

During hospitalization, the nursing satisfaction of patients in the observation group was higher than that in the control group (P<0.05; **Table 6**; **Figure 1**).

**Discussion**

ICH induces local microcirculation disturbance, increased intracranial pressure, cerebral ischemia and hypoxia, which easily leads to various serious sequelae such as neurological and limb dysfunction, affecting patients' daily life and mobility [16]. Although surgical treatment is commonly used, the risk of craniocerebral operation is high and the operation time is long, so perioperative high-quality nursing is essential to reduce postoperative complications [17].

In this study, the NIHSS scores of the two groups decreased while the scores of FMA and STEF increased after two weeks of intervention, with more significant changes in the observation group, suggesting that holistic rehabilitation nursing intervention is more conducive to the postoperative recovery of neurological and limb functions of patients with ICH. Presumably, following neurological damage, the neurological functional recovery process in ICH patients is extremely long despite the regeneration effect, and the recovery of the resulting limb dysfunction can be difficult. In this regard, holistic rehabilitation nursing intervention uses systematic and specific measures from the aspects of patients' psychology, motor ability and activities of daily life, which is beneficial to stimulate the damaged neurological function of patients, promote the formation of synapses, and build a brand-new neural loop network, thus promoting the damaged neurological function and limbs of patients [18, 19]. Song et al. found that compared with the traditional nursing model, holistic rehabilitation nursing intervention can accelerate the recovery of neurological function in patients with ICH during the perioperative period, which is consistent with our findings [20]. In addition, the HAMA and HAMD scores of patients in the observation group were found to be lower than those in the control group upon discharge, suggesting that holistic rehabilitation nursing intervention is more helpful to relieve the postoperative adverse psychological mood of patients with ICH, which may due to the fact that this nursing model pay more attention to the psychological needs of patients. When patients are hit by sudden disease, they will suffer from bad psychological emotions, coupled with worries about surgical risks and prognosis, resulting in adverse psychological moods and even depression in serious cases. The holistic rehabilitation nursing intervention model provides targeted psychological counseling according to the actual situation of patients; by highlighting successful previous treatments and better recovery cases, it enhances patient's confidence in overcoming the disease and mitigates their bad psychological state [21]. Afifi et al. also found that compared with the traditional nursing model, the implementation of perioperative holistic reha-

**Table 3.** FMA and STEF scores before and after intervention in the two groups ($\overline{x} \pm sd$, points)

| Group | Time | FMA scores | STEF scores |
|---|---|---|---|
| Observation group (n=56) | Before the intervention | 35.59±5.44 | 60.06±6.95 |
| | Intervention in 2 weeks | 49.97±5.90[*,#] | 75.58±5.80[*,#] |
| Control group (n=56) | Before the intervention | 36.03±6.48 | 59.87±5.70 |
| | Intervention in 2 weeks | 43.39±5.86[*] | 67.79±6.42[*] |

Note: FMA: Fugl Meyer Assessment; STEF: Simple Test for Evaluating hand Function. Compared with before intervention, [*]P<0.05; compared with Control group, [#]P<0.05.

**Table 4.** HAMA and HAMD scores before and after intervention in the two groups ($\overline{x} \pm sd$, points)

| Group | Time | HAMA scores | HAMD scores |
|---|---|---|---|
| Observation group (n=56) | Before the intervention | 7.25±1.06 | 6.99±1.24 |
| | Intervention in 2 weeks | 5.14±1.27[*,#] | 5.03±1.25[*,#] |
| Control group (n=56) | Before the intervention | 7.17±1.26 | 6.40±1.19 |
| | Intervention in 2 weeks | 6.50±1.33[*] | 5.67±1.05[*] |

Note: HAMA/HAMD: Hamilton Anxiety/Depression Scale. Compared with before intervention, [*]P<0.05; compared with Control group, [#]P<0.05.

**Table 5.** ADL scores before and after intervention in the two groups ($\overline{x} \pm sd$, points)

| Group | Time | PSMS scores | LADL scores | ADL scores |
|---|---|---|---|---|
| Observation group (n=56) | Before the intervention | 14.40±4.05 | 24.49±4.44 | 38.89±4.68 |
| | Intervention in 2 weeks | 6.60±3.40[*,#] | 15.58±3.86[*,#] | 22.18±4.22[*,#] |
| Control group (n=56) | Before the intervention | 13.95±3.66 | 24.95±3.75 | 38.90±5.20 |
| | Intervention in 2 weeks | 8.47±2.55[*] | 19.88±3.93[*] | 28.35±4.55[*] |

Note: ADL: Activities of daily living; PSMS: Physical Self-Maintenance Scale; IADL: Instrumental Activity of Daily Living Scale. Compared with before intervention, [*]P<0.05; compared with Control group, [#]P<0.05.

**Table 6.** Comparison of nursing satisfaction between two groups of patients (n, %)

| Group | Satisfied | Generally satisfied | Dissatisfied | Overall satisfaction |
|---|---|---|---|---|
| Observation group (n=56) | 26 (46.43) | 26 (46.43) | 4 (7.14) | 52 (92.86) |
| Control group (n=56) | 20 (35.71) | 23 (41.07) | 13 (23.21) | 43 (76.79) |
| Z/χ² | | 5.731 | | 5.617 |
| P | | 0.057 | | 0.018 |

ing satisfaction. This is because following neurological function impairment, a variety of physiological functions of ICH patients are limited, leading to significantly reduced activities of daily living. While under holistic rehabilitation nursing intervention, patients are encouraged to start with simple daily activities such as eating, undressing, urinating and defecating, which not only improves patients' daily activities, but also enables them to see their own changes and increases their self-confidence. Besides, the nursing staff instructed the patients to use the healthy limb to drive the affected limb to move, which help to restore the coordination of bilateral limb activities and promote the recovery of patients' ability of daily living after operation [23]. Ekvall et al. found that holistic rehabilita-
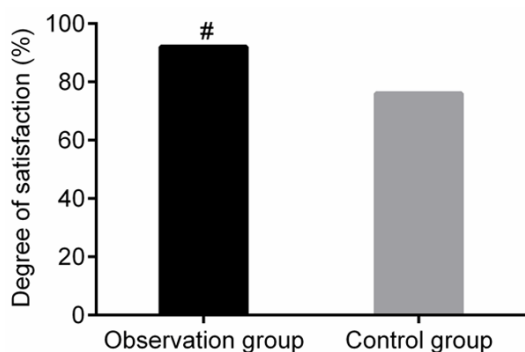
bilitation nursing intervention is more helpful to reduce postoperative tension and anxiety of patients [22].

Moreover, PSMS, IADL scores and total ADL scores were observed to be lower and nursing satisfaction to be higher in the observation group as compared to the control group after 2 weeks of intervention, indicating that holistic rehabilitation nursing intervention contributes to the improvement of postoperative activities of daily living of ICH patients, with higher nurs-

**Figure 1.** Comparison of nursing satisfaction between the two groups. Compared with Control group, #P<0.05.

tion nursing intervention for stroke patients improved the quality of life better than the traditional nursing model [24].

However, this study is a single center clinical study with a limited sample size and short follow-up time; hence, further research is warranted to confirm the effects of holistic rehabilitation nursing intervention measures on postoperative complications and long-term limb function of patients with ICH.

To sum up, holistic rehabilitation nursing intervention is more conducive to the recovery of postoperative neurological and limb functions of patients with ICH. It can alleviate the adverse psychological mood of patients and significantly improve their activities of daily living after operation.

**Disclosure of conflict of interest**

None.

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