

Original Article

Application of trinity new model home nursing in postoperative management of children with Hirschsprung's disease

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Abstract: Objective: To explore the application effect of Trinity new model home nursing in postoperative management of children with Hirschsprung's disease (HD). Methods: A retrospective control research was designed, including 80 HD children underwent surgical treatment. According to the nursing model, the children were divided into control group (n=40) and observation group (n=40). They received conventional nursing and Trinity home nursing intervention respectively. The defecation function and quality of life, scores of self-rating anxiety scale (SAS) and family caregiver task inventory (FCTI), incidence of complications and nursing satisfaction before surgery, 3 and 6 months after surgery between the two groups were compared. Results: Compared with the control group, the children in the observation group had lower Wexner constipation and fecal incontinence scores at 3 and 6 months after surgery (both $P<0.001$), while the children's quality of life generic core scale (PedsQLTM4.0) scores at 6 months after operation were higher than those in the control group ($P<0.001$). The SAS and FCTI scores of family members in the observation group were lower than those in the control group after intervention (all $P<0.001$). Compared with the control group, the observation group had lower total incidence of complications and higher nursing satisfaction (all $P<0.05$). Conclusion: Trinity new model home nursing can effectively increase the intestinal management quality of children undergoing HD surgery, improve their defecation function and quality of life, and reduce the risk of complications.

Keywords: Trinity new model home nursing, congenital Hirschsprung's disease, intestinal management, Wexner score, quality of life

Introduction

Hirschsprung's disease (HD) is a disease with the absence of distal intestinal ganglion cells. Generally, children suffer severe functional intestinal obstruction shortly after birth [1]. The main clinical treatment is to resect the diseased intestine and restore the continuity of the intestine after diagnosis [2]. Although many patients can restore certain intestinal function after operation, there may be persistent defecation disorder, such as constipation or fecal incontinence [1, 3, 4].

Persistent defecation disorder not only seriously affects the healthy growth of children, but also has a serious negative impact on their physiology, psychology, behavior and quality of life [5, 6]. Therefore, scientific and effective

intestinal management and restore of defecation function after operation are important contents in the treatment of HD children [7, 8]. However, the traditional nursing model lacks pertinence, continuity and systematic management, and most of the existing studies only involve the management of adult fecal incontinence, and there is still no reliable management experience for children. Bischoff et al. summarized the management plan and experience of fecal incontinence in children in the past 30 years, involving more than 700 children [9]. Through the systematic intestinal management strategy from the aspects of diet, medicine, biofeedback training, etc., the success rate of intestinal management of children in the study was as high as 95%. Bischoff and his colleagues thought that the ideal scheme of intestinal management should be combined with dif-

ferent treatment methods and managed scientifically and systematically. But this research is mainly aimed at children undergoing anorectal malformation surgery, and its applicability in various countries is still vague. Based on the intestinal management strategy of pediatric fecal incontinence proposed by Bischoff et al., combined with the characteristics of Chinese children and expert advice, we developed a systematic postoperative intestinal management strategy for HD children. In addition, we proposed the “hospital-community-family” Trinity nursing model. It is a continuous nursing model, involving the cooperation and coordination of general hospitals, community health service centers, patients and their family members, and finally provides patients with comprehensive, personalized and continuous health services. At present, this nursing model has been widely used in the management of many chronic diseases, such as diabetes, cerebrovascular and chronic respiratory diseases, and achieved remarkable results [10, 11]. In this research, we reviewed and analyzed the effectiveness of the new Trinity home nursing model on postoperative intestinal management in HD children, in order to provide effective reference for clinical practice.

Materials and methods

Patients

This research included 80 children with HD treated in the Department of Pediatric General Surgery, Hu'nan Children's Hospital from July 2019 to June 2020. Inclusion criteria: (1) All the children were diagnosed with congenital HD [12]; (2) Age >3 months; (3) Those received radical operation for HD in our hospital. Exclusion criteria: (1) Children with intestinal tumor; (2) Children with mental retardation; (3) Those complicated with severe infectious diseases; (4) Patients with incomplete follow-up data. Forty children who underwent surgery for Hirschsprung's disease from July to December 2019 (before the implementation of the new Trinity home nursing model) were classified as the control group, and they received the intervention of conventional nursing mode. Another 40 children received Trinity new home nursing model which was carried out on the basis of conventional nursing from January to June 2020 were classified as the observation group.

Ethics statement

This research was approved by the Ethics Committee of Hu'nan Children's Hospital (Approval No.: HCHLL-2021-38).

Nursing methods

Nursing methods of the control group: The control group received conventional nursing methods, including health education, psychological nursing, diet nursing and defecation habit training [13]. Before leaving the hospital, the guardians of the patients were given routine discharge education. Out-patient clinic and returning visit were required, and the defecation function was observed.

Nursing methods of the observation group: On the basis of the control group, the observation group was implemented with the Trinity new model home nursing intervention, that is, the model of hospital-community-family joint nursing [10].

A nursing group was established, which included the chief physician, head nurse, responsible nurse, community general nurse and the main caregivers of children. The group leader was the head nurse, who was responsible for the overall management of the group's overall work. The doctor in charge was mainly responsible for clinical treatment and management and communicated with the responsible nurses to adjust the treatment or nursing focus in time. The responsible nurses were responsible for implementing the specific nursing work (mainly the nursing of children in hospital), and the community general nurses were responsible for regular home follow-up, assisting, guiding and supervising the intestinal management, diet and medication of children, and patiently answering the related questions of their families.

Specific nursing measures (**Table 1**).

Outcome measures

Main outcome measures: (1) Defecation function of children in two groups was assessed at 3 and 6 months after operation by the Wexner scoring system [15]. The constipation score includes 8 items: the highest score for a single item is 4 points, the lowest score is 0 point, and

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Table 1. Trinity new home nursing measures

Items	Specific content
Intestinal management training	
Health education in hospital	Systematic health education is given to family members at the time of admission and within 3 days of admission, including theoretical knowledge of diseases, treatment methods, importance of intestinal management and precautions, etc.
Knowledge training of intestinal nursing	The Manual of Defecation Follow-up is issued and detailed explanations and guidance are given to parents, including postoperative diet guidance, defecation training guidance, anal dilation method guidance, biofeedback training, stoma nursing method, drug treatment guidance, etc. After the training, examination papers are made according to the manual, and parents' knowledge mastery is tested. Comprehensive evaluation and guidance is conducted to ensure that family members have sufficient nursing ability.
Continuous nursing outside hospital	
Diary management	When leaving the hospital, the parents will be issued with the Recipe Diary and the Defecation Diary and guided to fill in the methods.
Anal expansion guidance	The first outpatient follow-up is carried out 14 days after operation to demonstrate anal dilation method and instruct the family members to select the anal dilator model, and explain the prevention and treatment of common complications of anal dilatation [14].
Patient association and doctor-patient group are set up	According to parents' wishes, they are introduced to mutual help families on WeChat. All the mutual help families come from intervention group, and the children are similar in age, gender and treatment methods. Parents can communicate with each other, share their care experience and get emotional support to establish common goals. A WeChat group of doctors and patients is created for families in the intervention group, to timely provide guidance to solve the problems of children or their families.
Regular follow-up	Fourteen days after the operation, the nurse in charge makes a telephone follow-up to obtain the wound healing status of the children, instructs the parents of medication and hip bath, and guides the parents to do a good job in intestinal management. One month, three months and six months after operation, the patients are followed up to know the intestinal management and the recovery of defecation function, to communicate with parents about the problems in management, to relieve their negative emotions, and to evaluate their compliance with intestinal management. The community general nurses start to visit the children once a month after the operation, to understand and assist the parents in intestinal management such as anal dilatation and defecation function training. In case of special circumstances, the nurses should timely feedback to the superior physician in charge and the responsible nurse, and deal with it in time.

the total score is 32 points. The higher the score, the more serious the constipation is. The fecal incontinence score includes 5 items, with the highest score of 4 and the lowest score of 0. The total score of 20 is complete incontinence and 0 is normal. The higher the score, the more serious the fecal incontinence is. (2) Quality of life of children in the two groups before and 6 months after operation was evaluated by the generic core scale of children's quality of life (PedsQLTM4.0), including four dimensions of role function, social function, emotional function and physiological function, with 23 items in total. The total score is converted into 0-100 points, and the higher the score, the better the quality of life of children is [16]. (3) The anxiety level of family members before and after intervention was assessed by the Self-rating Anxiety Scale (SAS) [17], which includes 20 items. Each item scores 1-4, the

total score is 20-80, and the total score >40 indicates that there is obvious anxiety. The lower the score, the lighter the anxiety is. (4) The care ability of the main caregivers of the two groups before and after intervention was evaluated by the Caregiver Care Ability Scale (FCTI) [18], which includes five dimensions: adapting to the care role, dealing with personal emotional needs, responding to and providing assistance, adjusting life to meet care needs, and evaluating family and community resources. There are 25 items in total, with 0-2 points out of 50 for each item. The lower the score, the higher the care ability is.

Secondary outcome measures: (1) The complications of the two groups, including incision healing and perianal skin condition 14 days after operation, wound infection, anastomotic stricture, rectal mucosal damage and enteritis,

Table 2. Baseline data of the two groups of patients (n, %, $\bar{x} \pm sd$)

	Observation group (n=40)	Control group (n=40)	t/ χ^2	P
Gender			0.827	0.363
Male (n)	32 (80.00)	35 (87.50)		
Female (n)	8 (20.00)	5 (12.50)		
Age (month)	19.3 \pm 7.6	18.8 \pm 8.2	0.283	0.778
Hirschsprung type			1.053	0.305
Normal type (n)	39 (97.50)	37 (92.50)		
Whole colon type (n)	1 (2.50)	3 (7.50)		

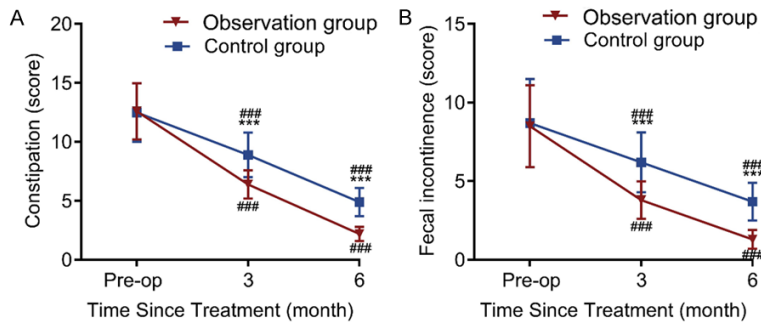


Figure 1. Wexner scores of the two groups of children before and after surgery. A. Constipation score; B. Fecal incontinence score. Compared with the observation group, ***P<0.001; compared with the same group pre-op, ###P<0.001.

were compared. (2) Nursing satisfaction in 13 indicators of the two groups was compared, which was categorized into very satisfied, basically satisfied and dissatisfied. The total score is 100 points, ≥ 90 points indicate very satisfied, 60-89 points indicate basically satisfied, <60 points indicate dissatisfied. Total satisfaction rate = (satisfied number + basically satisfied number)/total number $\times 100\%$ [19].

Statistical methods

SPSS Version 23.0 (SPSS, Inc., Chicago, IL, USA) software was used for data analysis. The counting data were expressed by the number of cases (n/%) and analyzed by Chi-square test. The measurement data conforming normal distribution were expressed as mean \pm standard deviation ($\bar{x} \pm sd$); inter-groups comparison was conducted with independent-samples t test, while intra-group comparison was assessed by paired t test; the defecation functions of the two groups at different time points were compared by repeated measure ANOVA, and SNK-q test was used for comparison after-

wards. The size of test was selected at bilateral $\alpha=0.05$. P<0.05 means statistically significant difference.

Results

Comparison of baseline data between the two groups of children

The children in both groups were mainly male. The common type was congenital HD. There was no marked difference in clinical data, such as gender, age and HD type, between the two groups (all P>0.05), indicating that the two groups were comparable (Table 2).

Comparison of postoperative defecation function between the two groups of children

The defecation function of the two groups of children was evaluated by the Wexner scoring system, including scores of constipation and fecal incontinence. There was no obvious difference in preoperative constipation (Figure 1A) and fecal incontinence scores (Figure 1B) between the two groups (both P>0.05). Three months after operation, the scores of constipation and fecal incontinence in both groups were lower than those before operation (both P<0.001), and further decreased at 6 months after operation (both P<0.001). Compared with the control group, the observation group had lower constipation and fecal incontinence scores 3 and 6 months after operation (P<0.001; Figure 1).

Comparison of improvement of postoperative quality of life between both groups

There was no marked difference in preoperative PedsQLTM4.0 scores between the two groups (P>0.05). Six months after operation, the scores of the two groups were higher than those before operation (all P<0.001). Compared with the control group, the observation group had a higher PedsQLTM4.0 score 6 months after operation (P<0.001; Table 3).

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Table 3. Comparison of PedsQLTM4.0 scores of children before and 6 months after operation (score, $\bar{x} \pm sd$)

Time	Observation group (n=40)	Control group (n=40)	t	P
Preoperative	49.21±5.02	48.97±4.95	0.215	0.830
6 months after surgery	85.41±7.92	70.56±6.88	8.952	<0.001
t	24.416	16.111		
P	<0.001	<0.001		

Note: PedsQLTM4.0: children's quality of life generic core scale.

Table 4. Comparison of SAS score and FCTI score before and after intervention by family members of the two groups (score, $\bar{x} \pm sd$)

	Observation group (n=40)	Control group (n=40)	t	P
SAS score				
Before intervention	52.45±4.32	50.97±4.53	1.495	0.139
After the intervention	33.45±2.52 ^{###}	44.29±2.58 ^{###}	19.001	<0.001
FCTI score				
Before intervention	40.33±2.34	41.25±3.02	1.523	0.132
After the intervention	23.55±2.01 ^{###}	36.38±2.25 ^{###}	26.895	<0.001

Note: Compared with the same group before intervention, ^{###}P<0.001. SAS: self-rating anxiety scale; FCTI: family caregiver task inventory.

Table 5. Comparison of complications and nursing satisfaction between the two groups (n, %)

Complications	Observation group (n=40)	Control group (n=40)	χ^2	P
Uncured incision	2 (5.00)	6 (15.00)		
Red skin around anus	3 (7.50)	10 (25.00)		
Wound infection	1 (2.50)	4 (10.00)		
Anastomotic stenosis	0 (0.00)	1 (2.50)		
Damaged rectal mucosa	1 (2.50)	4 (10.00)		
Enteritis	0 (0.00)	2 (5.00)		
Total incidence	7 (17.50)	27 (67.50)	20.460	<0.001
Satisfaction				
Very satisfied	20 (50.00)	6 (15.00)		
Basically satisfied	17 (42.50)	22 (55.00)		
Not satisfied	3 (7.50)	12 (30.00)		
Total satisfaction rate (%)	92.50	70.00	6.646	0.010

Comparison of anxiety level and care ability of family members of the two groups before and after intervention

There was no remarkable difference in SAS and FCTI scores between the two groups before and after intervention (all P>0.05). After intervention, the scores of patients' families in both groups were lower than those before and after operation (all P<0.001). Compared with the control group, the family members of the observation group had lower SAS and FCTI scores (both P<0.001; **Table 4**).

Comparison of complications and nursing satisfaction between both groups

Compared with the control group, the total incidence of complications in the observation group was lower (P<0.05), and the nursing satisfaction was higher than that in the control group (P<0.05; **Table 5**).

Discussion

Research has shown that the functional outcome of children with HD will be improved as

they get older [1]. Nevertheless, many studies have shown that the long-term outcome of children with HD in adulthood is not optimistic, and most HD children still have defecation disorder in adulthood, which seriously damages the quality of life of patients [20]. Therefore, it is vital to carry out effective intestinal management for children with HD and to reduce long-term defecation dysfunction after operation.

In this research, we formulated the early postoperative systematic intestinal management strategy for children with HD, and carried out the Trinity (hospital-community-family) new home care management. The results revealed that the Trinity home nursing model improved the quality and compliance of children's intestinal management, thus promoting the recovery of defecation function, quality of life and prognosis. Specifically, the children in the observation group had lower Wexner constipation and fecal incontinence scores than those in the control group at 3 and 6 months after operation, and the PedsQLTM4.0 scores at 6 months after operation were higher than those in the control group. In terms of complications, the total incidence of complications in the observation group decreased, while nursing satisfaction increased. This shows that the Trinity new home nursing has obvious advantages in postoperative intestinal management of HD children. Kumar et al. also manifested that systematic intestinal management could significantly restore defecation function in children with postoperative fecal incontinence [21].

On the basis of the training program of intestinal management in the United States, the systematic early intestinal management strategy was formulated in combination with China's national conditions, emphasizing the development of intestinal management from the time children were admitted to hospital, focusing on improving parents' management ability. We gave parents various forms of health education at the time of admission, within 3 days of admission and before discharge, in order to enhance their professional knowledge and attention to diseases. Children and their parents were also given basic nursing training, including postoperative diet guidance, defecation training guidance, drug treatment guidance, anal dilation method guidance, biofeedback training, stoma nursing methods, etc., and parents' mastery degree was evaluated

through examination, so as to ensure that parents have sufficient care ability. Trinity nursing of "hospital-community-family" is a continuous nursing mode widely developed in China recently. For example, the research on out-of-hospital management of diabetic patients shows that Trinity nursing can effectively improve the treatment compliance, self-management ability and quality of life of diabetic patients [22]. In the research, we carried out "hospital-community-family" Trinity continuous home nursing after the children were discharged from hospital, and further guided, assisted and urged parents' management ability and compliance in the process of intestinal management of children outside hospital, thus effectively ensuring the intestinal management of children outside hospital and promoting the recovery of their defecation function.

In addition, our research shows that the Trinity continuous home nursing can effectively reduce the anxiety state of caregivers of children and improve their care ability. The research results signify that the family members of the observation group have lower SAS and FCTI scores after intervention. After systematic training and operation of intestinal management knowledge, the caregivers' care and coping abilities were significantly increased, thus reducing parents' worries about taking care of children after discharge and in the future, and the children recovered well after operation, which further eased parents' anxiety [20]. Finally, we compared the nursing satisfaction of family members of the two groups, and the results showed that the total nursing satisfaction of the observation group increased. This reveals that the Trinity new home nursing has been highly recognized and accepted by the families of patients.

This research still has some limitations. First of all, our follow-up time is not long enough. Besides, we have not obtained the long-term outcome data of children. But we predict that the observation group will have a better prognosis. Furthermore, this is a single center study with small sample size, which needs to be verified by multi-center and large sample size randomized controlled experiments in the future.

In a word, our research shows that the Trinity new model home nursing can effectively improve the intestinal management quality of chil-

dren undergoing HD surgery, improve their defecation function and quality of life, and reduce the risk of complications.

Disclosure of conflict of interest

None.

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