

Original Article

Comprehensive nursing intervention after pediatric hernia surgery reduce postoperative pain and improves the postoperative clinical efficacy

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Abstract: Objective: To explore the effect of comprehensive nursing intervention in pediatric hernia surgery. Method: In total, 220 children receiving hernia surgery were prospectively analyzed. They were divided into the routine nursing group (N=112) and the comprehensive nursing group (N=108) according to their nursing methods. The clinical efficacy, postoperative pain and nursing satisfaction were compared. The time to ambulation, the hospital stay, and the occurrence of complications were recorded. Results: The effective rate of the comprehensive nursing group was significantly higher than that of the routine nursing group (all $P<0.05$). The postoperative Visual Analogue Scale (VAS) score in the comprehensive nursing group was significantly lower than that of the routine nursing group ($P<0.05$). The postoperative Face, Legs, Activity, Cry, Consolability (FLACC) score in comprehensive nursing group was significantly lower than that of the routine nursing group ($P<0.05$); the time to ambulation and the hospital stay in the comprehensive nursing group were significantly lower than those in the routine nursing group ($P<0.05$). The incidence of complications including urinary retention, dragging pain and wound pain in the comprehensive nursing group was significantly lower than that in the routine nursing group ($P<0.05$); the nursing satisfaction of the comprehensive nursing group was significantly higher than that in the routine nursing group ($P<0.05$). Conclusion: The comprehensive nursing intervention after pediatric hernia surgery will significantly reduce postoperative pain, shorten the hospital stay, improve the postoperative clinical efficacy and decrease the incidence of complications.

Keywords: Comprehensive nursing, pediatric hernia surgery, psychological state, incidence of complications

Introduction

Hernias is a disease where an organ or tissue located in the normal anatomical position of the human body enters into an abnormal anatomical location through a congenital or post-natal weak point, defect or hole [1]. Pediatric hernia is one of the most common diseases in pediatric surgery and hernia surgery has higher incidence in males than in females [2]. The inguinal hernia and umbilical hernia in pediatric patients younger than one year old may be cured automatically and the conservative therapy is always adopted. In other cases, surgeries are often applied, however, incidence of complications is increased and the postoperative healing is always affected because of the poor compliance of the pediatric patients caused by different intensities of pain in the surgical

wounds [3]. Because the psychological and physiological conditions of children are different from adults, the nursing methods should be carefully formulated, otherwise it will affect the effect of nursing and rehabilitation.

A study pointed out that the appropriate nursing care after pediatric hernia surgery would benefit the postoperative rehabilitation, reduce complications and improve prognosis of the pediatric patients [4].

Comprehensive nursing care centered on the caring procedure systemizes the caring procedures, as seeks the overall coordination and consistence. It integrates the advantages of primary nursing and the team nursing so as to ensure the high quality of nursing service and promote the recovery of patients [5, 6]. Compared with the conventional nursing methods,

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comprehensive nursing can help to develop appropriate nursing methods specialized for children with poor compliance and immature organ systems. It also takes the psychological and physiological conditions of children before, during and after surgery into account. Currently, few studies are aimed to explore the effects of comprehensive nursing on children with hernia surgery. This article is intended to study the clinical efficacy of comprehensive nursing in pediatric hernia surgery so as to improve the discomfort and resistance of children, enhance compliance of pediatric patients and improve the prognosis.

Methods

Subjects

The clinical data of 220 children who received hernia surgery in our hospital from May 2017 to December 2018 were prospectively analyzed. They were randomly divided into the routine nursing group (N=112) and the comprehensive nursing group (N=108) according to a random number table. The two groups of children were treated with different nursing measures from admission, and ended before discharge.

Inclusion criteria: the patients were in line with the clinical diagnostic criteria of pediatric hernia and aged from 0 to 7 years old; the pediatric patients and their family members signed the informed consent; the patients were given laparoscopic high ligation of left/right vaginalis. **Exclusion criteria:** patients with acute infection within 2 months, coagulopathy, cardiopulmonary dysfunction, major diseases in basic organs such as heart, liver and kidney and adhesions of abdominal cavity were excluded. This study has been approved by the ethics committee of the Wuhan Children's Hospital, and the family of each patient provided written informed consent.

Nursing method

Routine nursing care: The routine nursing care includes psychological nursing care, environment nursing care and other nursing care. **Psychological nursing care:** the pediatric patients are generally very young and they will be afraid and fearful after entering the unfamiliar environment and consequently become resistant. In addition, due to a lack of medical knowl-

edge associated to hernia surgery, the family members of the pediatric patients will be worried and have fear. The nurses should communicate with the children and their families to explain the causes, treatment measures, and the previous successful cases, eliminate the concerns and worries of families and establish trust. **Environmental care:** the ward of the pediatric patients shall be properly arranged to create a more comfortable and warm rehabilitation environment for the children. **Other care:** the children were assisted with the routine examinations, the advice on medication service and medication care should be followed, condition of the patients should be observed and gastrointestinal pressurization and health education shall be carried out.

Comprehensive care: **Preoperative care:** The pediatric patients are generally younger with immature organs and systems, and their family members may be subject to negative emotions due to lack of basic knowledge on hernia and hernia surgery [6]. Therefore, the nurses should communicate with the pediatric patients and their family members after admission, explain the basic knowledge of a hernia and hernia surgery and introduce the previous rehabilitation cases. **Diet care:** 1 day before the surgery, the nurse shall instruct the family members to give the children liquid food only and restrict the children from other non-liquid and gas-producing foods and the pediatric patients shall be prevented from drinking water after midnight.

Postoperative care: **diet care:** the nurse shall provide guidance to the family members to give fresh fruits and vegetables to the children as well as ensure the intake of a proper quantity of crude fiber every day so as to reduce or prevent constipation and postoperative abdominal distension. **Wound care,** the nurse shall help the pediatric patients to rest in the bed in the lateral position, and ensure the wound is not oppressed. Children with bilateral hernia surgery should rest in bed in a semi-reclining position with the cotton diapers placed on the perineum to prevent the wound from being contaminated by urine. The wound should be observed routinely to check the effusion or bleeding, if so, the wound shall be cleaned timely and kept dry. The scrotum shall be disinfected daily to prevent bacterial infection until the scrotum swelling is eliminated. **Pain care:** after the oper-

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Table 1. FLACC rating scale

Evaluation index	0 score	1 score	2 score
Face	Smile	Occasionally frown, face crooked, indifferent	Often jawed or clenched.
Legs	Relaxed position	Nervous, restless	Kick
Activity	Lie still, move freely	waggle	Body flexion, rigidity, or twisting
Cry	None	Groan. Sob. Occasional complaint	Keep crying. Cry loudly
Consolability	No consolation	A pat is comforting	It's hard to comfort

Table 2. VAS rating scale

Pain degree	Score
No pain	0
Mild pain, no impact on work or life	1-3
Moderate pain, affecting work, not life	4-6
Severe pain, affecting work and life	7-10

ation, as the anesthesia effect gradually recedes and the children feel the intensifying pain and cry, and at this time, the nurse shall strengthen the pain care and distract the attention of patients with food, cartoons and toys as well as ensure the quietness and comfort of the patients' ward. Meanwhile, attention should be paid to pacify the family members of the children, a medical and scientific explanation shall be given for any discomfort of the children and the corresponding treatment measures shall be taken.

Primary outcome measurements

At 3 days after surgery, clinical efficacy was evaluated and divided into three levels including excellence, effective and ineffective [7]. Excellence: the clinical symptoms and body signs such as abdominal pain and nausea of the patients all disappear without significant adverse reactions observed. Effective: the clinical symptoms or body signs such as abdominal pain and nausea in children were significantly improved with mild adverse reactions observed and without significant sequelae appearing. Ineffective: the symptoms or body signs including abdominal pain and nausea are not improved or are aggravated with the adverse reactions or even postoperative recurrence observed. Effective rate = cured rate + effectiveness rate.

The FLACC scale [8] and VAS scale [9] were adopted to evaluate the preoperative and postoperative pain of children at one day before and 3 days after surgery. Children aged ≤ 3 years old were evaluated with the FLACC scale while the

children aged >3 years old were evaluated with VAS scale. The FLACC scale was used to evaluate the pain of the pediatric patients from the perspectives of facial expressions and biological behaviors etc., including facial expression, body movements, behavior, crying and consolability, 5 items in total. Each item is scored from 0 to 2 with the total scores from 0 to 10 (Table 1). The VAS scale was applied by drawing a long straight line (typically 100 mm in length) with one end representing painless (0 point) and the other end representing severe pain (10 points) and the patients were instructed to draw a cross-line in the position that best reflects the level of his pain. The evaluator estimates the pain level of the patients based on the marked position (Table 2).

Secondary outcome measures

The time to ambulation and the hospital stay were observed in the two groups, the occurrence of complications including urinary retention, wound infection and dragging pain were recorded and the incidence of complications in each group was calculated and compared.

At one day before discharge, the nursing satisfaction was investigated among the pediatric patients and the family members in each group according to the nursing satisfaction questionnaire of Zhuo, etc. [10]. The nursing satisfaction questionnaires were distributed to patients' families and the nursing satisfaction was divided into three levels including satisfaction, general satisfaction, and dissatisfaction. The total satisfaction rate was recorded. Satisfaction rate = satisfaction + general satisfaction.

Data analysis and processing

The data was analyzed and processed by SPSS 19.0 software system (IBM, SPSS, Chicago, IL, USA). The measurement data was expressed by ($\bar{x} \pm S$) and analyzed by independent t test. The same outcome measure in one group before

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Table 3. Two groups of general clinical data

	Routine nursing group (n=112)	Comprehensive nursing group (n=108)	t/ χ^2	P
Age (year)	3.92±0.92	4.11±1.21	1.308	0.193
Age range (year)	0.5-6	0.2-7	/	/
Gender [n (%)]			0.423	0.515
Female	64 (57.14)	57 (52.78)		
Male	48 (42.86)	51 (47.22)		
Lesion location			2.406	0.300
Left	39 (34.82)	40 (37.04)		
Right	51 (45.54)	55 (50.93)		
Bilateral	22 (19.64)	13 (12.04)		
Stature (cm)	101.23±32.12	104.21±41.23	0.597	0.552
Weight (kg)	24.32±6.53	25.32±7.54	1.050	0.295
Family situation			0.859	0.354
Single parent	16 (14.29)	11 (10.19)		
Parents	96 (85.71)	97 (89.81)		
ALT (U/L)	25.43±5.43	24.45±5.12	1.378	0.170
AST (U/L)	39.64±6.54	41.23±9.76	1.414	0.159
PT (s)	11.93±0.75	12.13±0.82	1.886	0.061
APTT (s)	25.43±4.32	26.43±5.11	1.565	0.119
TT (s)	17.54±6.43	16.43±5.88	1.337	0.183
FIB (g/L)	2.45±0.11	2.51±0.33	1.796	0.075

Table 4. Comparison of clinical effects between the two groups

	Routine nursing group (n=112)	Comprehensive nursing group (n=108)	χ^2	P
Clinical curative effect			19.370	0.000
Excellent	66 (58.93)	73 (67.59)		
Good	15 (13.39)	28 (25.93%)		
Fair	31 (27.68%)	7 (6.48%)		
Effective rate	81 (72.32)	101 (93.51)	17.290	0.000

and after nursing was compared with paired t test. The count data was expressed with percentage and analyzed by chi-square test. The level of significance was $\alpha=0.05$.

Results

No differences were found in clinical data

There were no significant differences in age, gender, and lesion sites between the two groups ($P>0.05$). The indexes reflecting the liver and kidney function such as alanine aminotransferase (ALT) and aspartate aminotransferase (AST) were normal and not significantly different between the two groups ($P>0.05$). The prothrombin time (PT), activated partial thromboplastin time (APTT), thrombin time (TT) and fibrinogen (FIB) and other indexes reflecting the coagulation functions were normal in the two

groups and there was no difference between the two groups ($P>0.05$) (**Table 3**).

Comprehensive nursing group showed higher clinical efficacy

The effective rate of the comprehensive nursing group was significantly higher than that of the routine nursing group ($P<0.05$) (**Table 4**).

Comprehensive nursing group showed lower VAS scores

The postoperative VAS scores in the comprehensive nursing group were significantly lower than that of the routine nursing group ($P<0.05$). The postoperative VAS scores in both the routine nursing group and the comprehensive nursing group were significantly lower than the preoperative VAS scores ($P<0.05$) (**Figure 1**).

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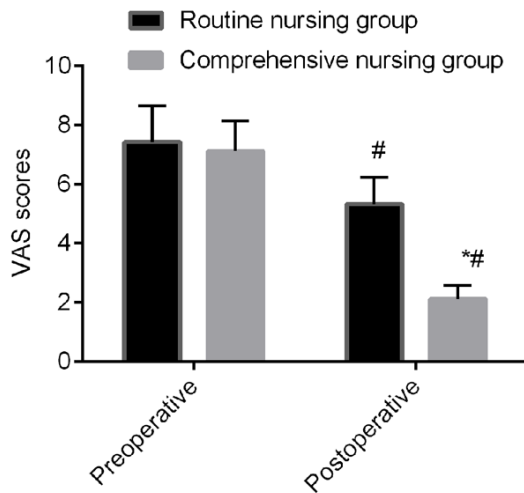


Figure 1. Comparison of VAS scores between two groups. There was no significant difference in VAS score between the two groups before operation ($P>0.05$). The VAS score of postoperative comprehensive nursing group was significantly lower than that of routine nursing group ($P<0.05$). The VAS scores in the routine nursing group and the comprehensive nursing group were significantly lower than those in the preoperative nursing group ($P<0.05$). Note: *: the same test point, compared with the Routine nursing group, $P<0.05$. #: the same group, compared with the preoperative, $P<0.05$.

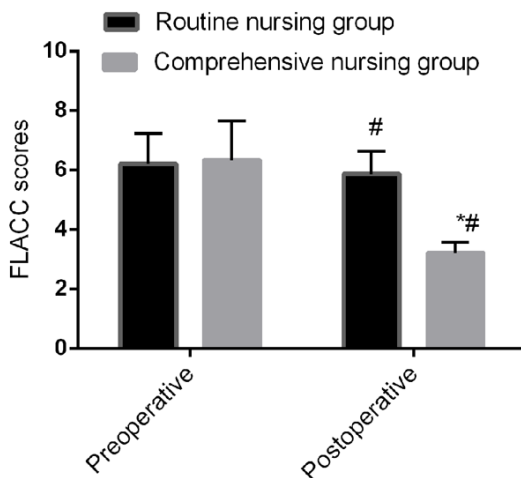


Figure 2. Comparison of FLACC scores. There was no significant difference in FLACC score between the routine nursing group and the comprehensive nursing group before operation ($P>0.05$), but the FLACC score decreased significantly after operation ($P<0.05$). The FLACC score of the postoperative comprehensive nursing group was significantly lower than that of the conventional nursing group ($P<0.05$). Note: *: the same test point, compared with the Routine nursing group, $P<0.05$. #: the same group, compared with the preoperative, $P<0.05$.

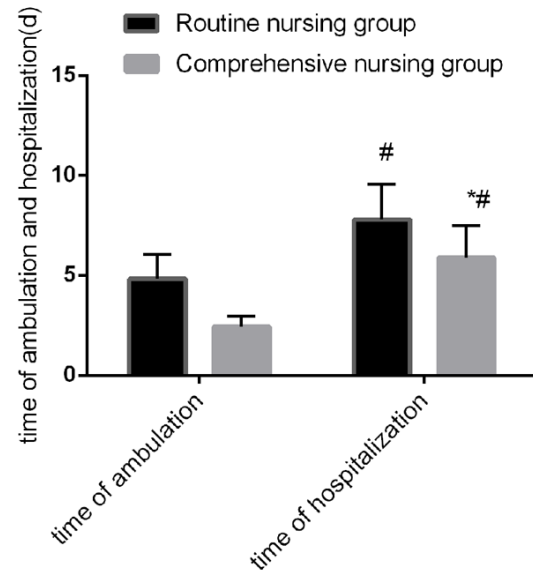


Figure 3. Comparison of time to ambulation and hospitalization. The time to get out of bed, and stay in hospital in the integrated nursing group were significantly lower than those in the conventional nursing group ($P<0.05$). Note: *: the same test point, compared with the Routine nursing group, $P<0.05$. #: the same group, compared with the preoperative, $P<0.05$.

Comprehensive nursing group showed lower FLACC scores

The postoperative FLACC scores in the comprehensive nursing group were significantly lower than that of the routine nursing group ($P<0.05$) (**Figure 2**).

Comprehensive nursing group showed shorter time to ambulation and hospital stay

The time to ambulation and the hospital stay in the comprehensive nursing group were significantly shorter than those in the routine nursing group ($P<0.05$) (**Figure 3**). The incidence of urinary retention, dragging pain, wound pain and other complications in the comprehensive nursing group was significantly lower than that in the routine nursing group ($P<0.05$) (**Table 5**).

Comprehensive nursing group showed higher nursing satisfaction

The satisfaction rate in the comprehensive nursing group was significantly higher than that of the routine nursing group ($P<0.05$) (**Table 6**).

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Table 5. Clearance of complications

Complications [n (%)]	Routine nursing group (n=112)	Comprehensive nursing group (n=108)	χ^2	P
Urinary retention	8 (7.14)	1 (0.93)	5.416	0.020
dragging pain	12 (10.71)	2 (1.85)	7.247	0.007
Wound infection	7 (6.25)	1 (0.93)	4.448	0.035
Total	27 (24.11)	4 (3.70)	18.910	0.000

Table 6. Comparison of nursing satisfaction between two groups

	Routine nursing group (n=112)	Comprehensive nursing group (n=108)	χ^2	P
Nursing satisfaction [n (%)]			6.798	0.033
Satisfied	59 (52.68)	64 (59.26)	7.247	0.007
General satisfaction	36 (32.14)	39 (36.11)		
Not satisfied	17 (15.18)	5 (4.63)		
Satisfaction rate	95 (84.82)	103 (95.37)		

Discussion

The pediatric hernia is one of the common diseases in children and develops rapidly [11]. At present, the surgery treatment is also applicable in addition to the conservative treatment in clinical practice. However, the pediatric patients are young, the treatment and nursing compliance in the pediatric patients are not as good as in the adult patients, and the children are not cooperative to the treatment. Furthermore, the common postoperative pain will further reduce the compliance of children, therefore, the reasonable clinical care measures as the effective adjuvant therapy are necessary in addition to the treatment [12-14].

This study found that the VAS and FLACC scores in the comprehensive nursing group decreased significantly compared with those in the routine nursing group, which indicated that the postoperative pain level of the comprehensive nursing group was significantly milder than that of the routine nursing group, and the comprehensive nursing intervention is capable of improving the postoperative pain of children. The time to ambulation and the hospital stay in the comprehensive nursing group were significantly shorter than those in the routine nursing group; the incidence of urinary retention, dragging pain, wound pain and other complications in the comprehensive nursing group was significantly lower than that in the routine nursing group, and the nursing satisfaction in the comprehensive nursing group was significantly

higher than that of the routine nursing group: which all indicated that the comprehensive nursing mode did significantly improve the comfort of the children during rehabilitation period compared with the routine nursing mode and was beneficial for the smooth recovery of the children. It has been reported [15] that the complication incidence of the comprehensive nursing group was lower than that of the routine nursing group,

while the nursing satisfaction of the comprehensive nursing group was higher than that of the routine nursing group, which was consistent with the result of this study. However, the result of the clinical efficacy was inconsistent with this study where no significant difference was concluded, which may be caused by the difference of the selected subjects. The selected subjects in the published studies were children with inguinal hernia while the included subjects in this study suffered from not only inguinal hernia but also umbilical hernia. The children with umbilical hernia were always younger, most of them were infants and babies with poor compliance, and the operation in them was also difficult, so the clinical efficacy was different. There was another study which reported that [16] the anal exhaust time and hospital stay of the comprehensive nursing group were superior to the routine nursing group and the complication incidence was also significantly lower than that of the routine nursing group, which was consistent with the results of this study. At the same time, some studies have found that [1] the bedtime activity time and hospital stay of the patients in the comprehensive nursing group were shorter than the basic nursing group, the VAS score and complication incidence in the comprehensive nursing group were also significantly lower than those of the basic nursing group, and the nursing satisfaction in the comprehensive nursing group was significantly higher than that of the basic nursing group, which was consistent with the results of this study.

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The result of a study demonstrated that routine nursing had failed to meet the needs of patients after the hernia surgery and that comprehensive nursing comprehensively considering the psychological, physiological and other factors of the children, and was better to ensure the healing after operation and was more beneficial to the prognosis of children [17]. The comprehensive nursing care adopted preventive measures as various accidents can easily occur to the pediatric patients during hernia surgery, and thus made corresponding countermeasures [4]. The comprehensive nursing care gave emphasis to the preoperative psychological instruction, preoperative and postoperative dietary guidance, wound care and pain care based on the routine nursing care [18]. The preoperative psychological intervention was very important in the process of comprehensive nursing [19]. The pediatric patients are generally very young in age and are more likely to be fearful of the unfamiliar hospital environment and the discomfort caused by the hernia, in addition, the crying of children will exert a great psychological burden on the parents, so the psychological intervention should not only target to the children but also to the family members of the patients [20]. The health education on the disease will help to appropriately eliminate the psychological discomfort of the children and the parents such as fear and worry and promote the parents to assist the nursing staff with completion of various nursing operations, so that the children will more actively cooperate with various medical and nursing care workers, the operation time will be shortened with the cooperation of professional nursing staff, the operation process will be accelerated and various intraoperative risks will be reduced to some extent [18, 21].

Pain is a subjective feeling and is hard to evaluate accurately due to the impact of various factors in children, so evaluation with a different manner is necessary [22]. FLACC scores are commonly used in newborns and infants because the newborns and infants have no cognition of pain yet, and the FLACC scores are mainly assessed by facial expressions and biological behaviors and it is very useful to very young children [23, 24]. Regarding preschool children aged 3-7 years old, the VAS score is often used because it is possible for them to distinguish pain from painless and describe the degree of

pain [25, 26]. In the study, the average age of the two groups of patients was around 4 years old, but the age span ranged from a few months to 7 years old, so two different rating scales were used in different ages to evaluate and compare the pain.

As to the shortcomings of this study, there is no guarantee that the surgical outcome of each child is exactly the same. And because this is a prospective study, it is difficult to avoid the impact of the Hawthorne effect. In this study, we can't guarantee that children and their families will follow the same notice and precautions in the study, but we strengthen communication with children and their families, so that they can do their best to follow this study.

In summary, the implementation of comprehensive nursing intervention after pediatric hernia surgery will significantly reduce the postoperative pain in children, shorten the hospital stay and bed time, improve the postoperative clinical efficacy and reduce the incidence of complications.

Disclosure of conflict of interest

None.

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