Original Article

Effect of a nursing case management model on the uncertainty in recovery in patients with vascular crisis after finger replantation

Qiaoli Mo¹, Risheng Qiu¹, Songhe Cheng², Xiaomin Chen¹, Aiping Peng¹

¹Department of Hand Surgery, Affiliated Xiaolan Hospital, Southern Medical University, Zhongshan 528415, Guangdong Province, China; ²Department of Pain Management, Affiliated Xiaolan Hospital, Southern Medical University, Zhongshan 528415, Guangdong Province, China

Received July 17, 2020; Accepted November 5, 2020; Epub January 15, 2021; Published January 30, 2021

Abstract: Objective: To investigate the effect of a nursing case management model (NCMM) on the uncertainty in illness recovery in patients with vascular crisis after finger replantation. Methods: The clinical data of 109 patients who underwent finger replantation in our hospital were collected retrospectively. Patients were divided into two groups according to the manner of intervention. Group A received routine health education and group B received NCMM on the basis of care given to group A. The scores of Mishel Uncertainty in Illness Scale (MUIS), Self-rating Anxiety Scale (SAS), Self-rating Depression Scale (SDS) and Visual Analogue Scale (VAS), the survival rate of the replanted fingers, treatment and nursing comfort, and nursing satisfaction were compared between the two groups before and after intervention. Results: After intervention, patients in group B exhibited lower scores than patients in group A in 4 dimensions including unpredictability, inconsistency, complexity and ambiguity, SDS, SAS, and VAS (P<0.05). The survival rate of the replanted fingers in group B was 96.36%, which was higher than that of 72.22% in group A (P<0.05). Patients in group B showed a higher high-comfort rate (50.91% vs. 29.63%), a higher moderate-comfort rate (47.27% vs. 27.78%) and a reduced low-comfort rate (1.82% vs. 42.39%) than those in group A, with a significant difference (P<0.05). The scores of nursing attitude, nursing responsibility, nursing professional skills and nursing professional knowledge in group B were higher than those in group A (P<0.05). Conclusions: NCMM is able to reduce the uncertainty in illness recovery in patients with vascular crisis after finger replantation and is a valuable method to improve the mental status and nursing comfort and satisfaction.

Keywords: Nursing case management model, finger replantation, vascular crisis, uncertainty in illness

Introduction

Finger replantation refers to reattaching and replanting the nerves, vessels and other tissues of amputated fingers by means of microsurgical technique, which is one of the treatment techniques in clinical surgery [1]. With the continuous improvement of microsurgical techniques, China has been in a leading position of finger replantation in the world. This treatment plays an essential role in the survival and function of amputated fingers. The survival rate of replanted fingers is closely correlated to the blood circulation of repaired vessels [2, 3].

As a common complication after finger replantation, vascular crisis refers to a series of physiological and pathological changes caused by the hemodynamic disorders of anastomosed arteries and veins after finger replantation [4, 5]. Individuals who have self-injury behaviors, smokers, pregnant women, children and females are more likely to develop vascular crisis after finger replantation [6]. There are a variety of clinical methods to deal with vascular crisis, including venous perfusion, anticoagulation by heparin sodium and bloodletting, prostaglandin E1, urokinase, surgical exploration and hyperbaric oxygen [7, 8]. Although the above methods have certain therapeutic effects for vascular crisis, patients not only suffer from fear about their amputated fingers but also worry about the surgical outcomes of finger replantation, leading to negative emotions such as anxi-
Effect of NCMM in patients with vascular crisis after finger replantation

ety, fear and uneasiness [9]. Moreover, when vascular crisis occurs after finger replantation, patients are prone to uncertainty in their recovery due to lack of surgical knowledge [10, 11]. Studies have shown that uncertainty about recovery has a significant impact on patients’ psychological adaptability and adjustment ability. In addition, patients’ negative emotions and mental stress may also be aggravated, and disrupt the patients’ ability to reaming positive about healing, thus leading to treatment interruption or depression [12]. Therefore, a scientific and reasonable intervention nursing model is necessary to reduce the uncertainty in illness in patients with vascular crisis after finger replantation.

Previous intervention methods usually give patients routine health education to enrich their knowledge of disease and surgery, however, this care often lacks flexibility and individualization, making patients especially vulnerable to the uncertainty in their recovery [13, 14]. Nursing case management model (NCMM) is a novel nursing model that has emerged in recent years which integrates planning, coordination, service, evaluation and monitoring, and provides segmented care for patients [15]. As reported, NCMM exhibits satisfactory application value in improving patients’ negative emotions and relieving uncertainty in recovery [16]. In view of this, our study is innovative and feasible in the application of NCMM to nursing intervention for patients with vascular crisis after finger replantation.

Materials and methods

Materials

The clinical data of 109 patients who underwent finger replantation in our hospital were collected retrospectively. Patients were divided into group A (n=54) and group B (n=55) according to the intervention manner. Group A received routine health education and group B received NCMM in addition to the treatment of group A. (1) Inclusion criteria: Patients were informed and agreed to treatment protocols; patients were in a normal mental state; patients had surgical indications of replantation of a severed finger; this study was approved by the Medical Ethics Committee; patients had normal communication ability; patients voluntarily participated in the research. (2) Exclusion criteria: Withdrawal; surgical contraindications; cognitive and mental disorders; patients combined with serious organ diseases such as in the liver, kidney and heart; or communication disorders.

Methods

Patients in group A received routine health education. A primary nurse strengthened health education orally, to patients, including the causes of vascular crisis after finger replantation, treatment and nursing methods, ward environment, etc.

Patients in group B received NCMM on the basis of treatment in group A. A specialized case management team was established, which consisted of a nutritionist, psychological consultant, rehabilitation therapist, specialist nurse and specialist doctor. All members were required to have a bachelor’s degree or above, more than 10 years of clinical work experience, and strong communication and organizing ability. Additionally, they needed to have unified and professional case management training. Finally, only after passing an examination could they provide nursing services for patients.

Implementation process: (1) Evaluation: First, members of the case management team comprehensively evaluated the patient’s knowledge level, mental and social status and acceptability, and then established a file for each patient. (2) Plan: Members of the case management team made a feasible and individualized intervention plan for each patient based on his/her evaluation results. (3) Service: Based on the acceptability and cultural background of each patient, members of the case management team explained to the patient the knowledge related to vascular crisis after finger replantation, from the superficial to the complex (including risk factors, mechanism, clinical manifestations, treatment, prevention methods of complications and related matters needing attention), strengthened targeted health guidance and encouraged patient’s families to actively participate in the nursing process. Family members were told to give love and care and were instructed to provide a high level of mental and social support to the patients. Furthermore, combined with the actual situation of the characteristics of each patient with vascular crisis after finger replantation, intuitive and informative health knowledge brochures were made to transmit recovery-related knowledge to the patients and improve their perception, in the
forms of cartoon images, pictures and words. Patients were allowed to record their questions in the note area reserved in brochure, and then the case management members explained these questions in detail. Members of the case management team made full use of their empathy to analyze patients' charming personality characteristics and formulated a targeted mental intervention plan and supporting strategy to ensure the patients' mental health, which in turn promoted their physical health. By this means, patients could build solid confidence in treatment, actively overcome anxiety and fear, leading to a higher survival rate of the replanted fingers. (4) Coordination: The leader of case management team coordinated with the different departments to ensure that, the whole team worked well together, and patients were willing to actively cooperate with imaging and laboratory examinations during treatment. Also, the leader strengthened the communication with the case management members to promote good health outcomes. (5) Monitoring: A good communication platform was built to insist on tracing patients’ rehabilitation conditions by outpatient follow-up combined with telephone follow-up. Members of case management team discussed the specific follow-up plan with patients, provided comprehensive guidance in medication, rehabilitation, exercise, treatment and diet, patiently listened to patients’ questions, and answered carefully. (6) Evaluation: On one hand, the case management team performed follow-up nursing care throughout the care, evaluated the nursing efficacy, solved patients’ problems in a timely manner during the treatment process, and developed mutual trust and harmonious nurse-patient relationship with both patients and their families. On the other hand, the case management team also guided patients to make needed adjustments and reduced their mental stress and negative emotions, so as to ensure the best recovery.

Observation index

Mishel Uncertainty in Illness Scale (MUIS) score [17]: MUIS was used to evaluate uncertainty in illness recovery in both groups before and after intervention, including 4 dimensions, namely, unpredictability (5 items), inconsistency (7 items), complexity (7 items) and ambiguity (13 items). All the items are rated on a 5-point Likert scale, and a higher score indicates higher uncertainty in illness recovery.

Self-rating Anxiety Scale (SAS) score and Self-rating Depression Scale (SDS) score [18]: SAS and SDS were used to evaluate anxiety and depression in both groups before and after intervention. The critical score for SAS and SDS is 50 and 53, respectively, and a higher score indicates more severe anxiety and depression.

Visual Analogue Scale (VAS) score [19]: VAS was used to evaluate pain in both groups before and after intervention. 11 numbers from 0 to 10 represent different degrees of pain, with 0 for painless and 10 for very severe pain. Higher scores indicate more severe pain.

The survival rate of replanted fingers was compared in both groups, and survival criteria denote that ruddiness at the end of the replanted fingers, with normal capillary reaction, normal temperature, and moderate tension [20].

Treatment and nursing comfort [21]: American Kolcaba general comfort questionnaire (GCQ) was used to evaluate treatment and nursing comfort in both groups after intervention. GCQ has a total score of 112. A score above 90 is considered as high comfort, ≤90 as moderate comfort, and ≤60 as low comfort.

Nursing satisfaction [22]: Nursing satisfaction was evaluated in both groups after intervention, including nursing attitude, nursing responsibility, nursing professional skills and nursing professional knowledge. Each item is evaluated with a centesimal system, and higher scores indicate higher nursing satisfaction.

Statistical analysis

SPSS 22.0 software was used to perform statistical analysis. Measurement data were expressed by mean ± standard deviation (mean ± SD). Normally distributed data were analyzed by t-test, and non-normally distributed data were analyzed by Mann-Whitney U test. Counting data were expressed by n (%). Chi-squared test was used to analyze the count data between groups. P<0.05 was considered statistically significant.

Results

Comparison of general data between the two groups

The proportion of male and female patients in group A was 57.41% and 42.59%, respectively,
Table 1. Comparison of general data between the two groups n (%)/ (\(\bar{x} \pm s\))

<table>
<thead>
<tr>
<th>Materials</th>
<th>Group A (n=54)</th>
<th>Group B (n=55)</th>
<th>(t/\chi^2)</th>
<th>(P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (case)</td>
<td></td>
<td></td>
<td>0.076</td>
<td>0.783</td>
</tr>
<tr>
<td>Male</td>
<td>31 (57.41)</td>
<td>33 (60.00)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>23 (42.59)</td>
<td>22 (40.00)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>42.28±1.35</td>
<td>42.32±1.31</td>
<td>0.157</td>
<td>0.876</td>
</tr>
<tr>
<td>Nature of injury (case)</td>
<td></td>
<td></td>
<td>0.018</td>
<td>0.859</td>
</tr>
<tr>
<td>Incised injury</td>
<td>15 (27.78)</td>
<td>17 (30.91)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crush injury</td>
<td>18 (33.33)</td>
<td>19 (34.55)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avulsion injury</td>
<td>16 (29.63)</td>
<td>13 (23.64)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>5 (9.26)</td>
<td>6 (10.91)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amputation site (case)</td>
<td></td>
<td></td>
<td>0.159</td>
<td>0.996</td>
</tr>
<tr>
<td>Thumb</td>
<td>12 (22.22)</td>
<td>11 (20.00)</td>
<td>0.159</td>
<td>0.996</td>
</tr>
<tr>
<td>Middle finger</td>
<td>15 (27.78)</td>
<td>13 (23.64)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Index finger</td>
<td>13 (24.07)</td>
<td>15 (27.27)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ring finger</td>
<td>8 (14.81)</td>
<td>9 (16.36)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Little finger</td>
<td>6 (11.11)</td>
<td>7 (12.73)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1. Comparison of MUIS scores between the two groups. (A) The comparison of unpredictability score between the two groups before intervention, with \(P>0.05\), and group B has lower unpredictability score than group A after intervention, with \(P<0.05\); (B) Shows the comparison of inconsistency score between the two groups before intervention, with \(P>0.05\), and group B has a lower inconsistency score than group A after intervention, with \(P<0.05\); the comparison of complexity score between the two groups before intervention is shown in (C) with \(P>0.05\), and group B has a lower complexity score than group A after intervention, with \(P<0.05\); (D) Comparison of ambiguity score between the two groups before intervention, with \(P>0.05\), and group B has a lower ambiguity score than group A after intervention, with \(P<0.05\); * refers to \(P<0.05\) compared with group A.

and that in group B was 60.00% and 40.00%, respectively, with no statistically significant difference between groups \((P>0.05)\). Patients of the two groups showed no significant difference in age, nature of injury and amputation site \((P>0.05)\) (Table 1).

Comparison of SDS scores and SAS scores between the two groups

The two groups showed no significant difference in SDS and SAS scores before intervention \((P>0.05)\). The scores of SDS and SAS decreased significantly in both groups after intervention \((P<0.05)\), and group B showed lower scores of SDS and SAS than group A after intervention \((P<0.05)\) (Figure 2).

Comparison of VAS scores between the two groups

The VAS score of group A was not significantly different from that of group B before intervention \((P>0.05)\), but both groups showed decreased VAS scores after intervention \((P<0.05)\). The VAS scores in group B were lower than those in group A after intervention \((P<0.05)\) (Figure 3).
Effect of NCMM in patients with vascular crisis after finger replantation

Comparison of the survival rate of replanted fingers between the two groups

Group A had 39 patients with survival of the amputated fingers, with a survival rate of 72.22%, while group B had 53 patients with survival of amputated fingers, with an overall survival rate of 96.36%. Thus, the survival rate of group A was lower than that of group B (72.22% vs. 96.36, \( P<0.05 \)) (Table 2).

Comparison of treatment and nursing comfort between the two groups

Patients in group B had a higher high-comfort rate (50.91% vs. 29.63%), a higher moderate-comfort rate (47.27% vs. 27.78%) and a reduced low-comfort rate (1.82% vs. 42.39%) than those in group A, showing a significant difference \( (P<0.05) \) (Table 3).

Comparison of nursing satisfaction between the two groups

Patients in group B had significantly higher scores for nursing attitude, nursing responsibility, nursing professional skills and nursing professional knowledge than those in group A \( (P<0.05) \) (Table 4).

Discussion

Vascular crisis is a common complication after finger replantation with various inducing factors. It is closely correlated with age, gender, amputation level, ischemia time, cause of injury, smoking history, etc. [23]. From the injury perspective, long-term ischemia, crush and avulsion injury and distal segment amputation are the main risk factors of vascular crisis [24]. Secondly, sudden trauma can cause nervous tension, coupled with tolerance for very severe pain, which is extremely easy to produce negative emotions such as anxiety and depression. However, negative emotion may in turn stimulate the sympathetic nervous system, leaving it an excited state and a consequent release of catecholamines, which trigger vasoconstriction or spasms and slow the blood flow of anastomosis, then thrombus forms and vascular crisis occurs [25]. Too low or too high temperature in the ward can promote vasoconstriction and accelerate tissue oxygen consumption and metabolism, leading to vascular crisis. Pain can induce the stress response, stimulate an enormous release of injury factors, promote vasoconstriction, and eventually cause vascular crisis [26].

Although vascular crisis has various treatment methods in the clinic, which can significantly improve the therapeutic effect and the survival rate of replanted fingers, some patients seri-
Effect of NCMM in patients with vascular crisis after finger replantation

Table 2. Comparison of the survival rate of replanted fingers between the two groups n (%)  

<table>
<thead>
<tr>
<th>Group</th>
<th>Case</th>
<th>The survival rate of replanted fingers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>54</td>
<td>39 (72.22)</td>
</tr>
<tr>
<td>Group B</td>
<td>55</td>
<td>53 (96.36) *</td>
</tr>
<tr>
<td>$X^2$</td>
<td></td>
<td>12.064</td>
</tr>
<tr>
<td>$P$</td>
<td></td>
<td>0.001</td>
</tr>
</tbody>
</table>

Note: *refers to $P<0.05$ compared with group A.

Table 3. Comparison of treatment and nursing comfort between the two groups n (%)  

<table>
<thead>
<tr>
<th>Group</th>
<th>Case</th>
<th>High comfort</th>
<th>Moderate comfort</th>
<th>Low comfort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>54</td>
<td>16 (29.63)</td>
<td>15 (27.78)</td>
<td>23 (42.59)</td>
</tr>
<tr>
<td>Group B</td>
<td>55</td>
<td>28 (50.91) *</td>
<td>26 (47.27) *</td>
<td>1 (1.82) *</td>
</tr>
<tr>
<td>$X^2$</td>
<td></td>
<td>5.126</td>
<td>4.413</td>
<td>26.382</td>
</tr>
<tr>
<td>$P$</td>
<td></td>
<td>0.024</td>
<td>0.036</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Note: *refers to $P<0.05$ compared with group A.

Table 4. Comparison of nursing satisfaction between the two groups ($X \pm s$, score)  

<table>
<thead>
<tr>
<th>Group</th>
<th>Nursing attitude</th>
<th>Nursing responsibility</th>
<th>Nursing professional skills</th>
<th>Nursing professional knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A (n=54)</td>
<td>71.15±1.25</td>
<td>70.09±2.29</td>
<td>73.25±1.18</td>
<td>71.16±1.08</td>
</tr>
<tr>
<td>Group B (n=55)</td>
<td>89.96±2.36 *</td>
<td>91.25±2.36 *</td>
<td>96.36±1.08 *</td>
<td>95.12±2.88 *</td>
</tr>
<tr>
<td>$t$</td>
<td>51.859</td>
<td>47.495</td>
<td>106.694</td>
<td>57.303</td>
</tr>
<tr>
<td>$P$</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Note: *refers to $P<0.05$ compared with group A.

Previously, patients with vascular crisis after finger replantation usually receive routine health education, however, its content is too mechanistic and lacks flexibility and individualization, so that patients often do not fully understand the occurrence and progression of the recovery, and are full of fear about the complex treatment process, followed by uncertainty in illness [28]. Therefore, our study adopted NCMM to care for patients with vascular crisis after finger replantation. The results showed that the scores of 4 dimensions in MUIS, SDS, SAS and VAS in group B were lower than those in group A, while the survival rate of the replanted fingers, nursing comfort and satisfaction were higher than those in group A, indicating that NCMM can alleviate uncertainty in illness recovery in patients with vascular crisis after finger replantation, improve patients’ mental status, nursing comfort and satisfaction. Wan et al. [29] also found that the level of uncertainty in illness of patients in the case nursing management group at discharge, 1 month and 2 months after discharge was lower than that in the control group, which was similar to this study to some extent, proving that the case management model was conducive to reducing uncertainty in illness of patients. The possible mechanisms are discussed as follows. First, NCMM is a novel clinical medical and nursing management system, which advocates regarding patients as the priority, focusing on service and integration and adopting a coordinated, holistic and continuous nursing model, so as to provide comprehensive care for patients, ensure patients’ access to high-quality nursing services and improve nursing services quality. Next, this nursing model can also help alleviate patients’ mental stress and enhance their sense of security and belonging. Meanwhile, NCCM increases nurses’ sense of achievement and responsibility, and effectively encourages improved nurse-patient communication and relationships. By this means, patients will have less uncertainty in illness and mental stress and burden, and the nursing comfort during the nursing process is correspondingly improved. In addition, NCMM can improve nursing efficacy and economic benefit through multi-department and multi-disciplinary communication, coordination and cooperation among case management members. In the nursing process, the whole-course and com-
Effect of NCMM in patients with vascular crisis after finger replantation

Comprehensive evaluation of patients and the establishment of a bridge of friendly communication between nurses and patients are beneficial to increase patients' compliance and medical experience, so as to alleviate their negative emotions [30].

To sum up, NCMM is beneficial to decrease the uncertainty in illness in patients with vascular crisis after finger replantation, improve their mental status, and increase nursing comfort and satisfaction.

Despite our results, our study still has the limitation of a small sample size, which requires further analysis with a larger sample size, a longer term and a more comprehensive research in the future.

Acknowledgements

This work was supported by “Painless Ward” for Reducing Vascular Crisis after Finger Replantation (No. 2019j239).

Disclosure of conflict of interest

None.

Address correspondence to: Aiping Peng, Department of Hand Surgery, Affiliated Xiaolan Hospital, Southern Medical University, No. 65, Jucheng Avenue Middle, Xiaolan Town, Zhongshan 528415, Guangdong, China. Tel: +86-18928101974; E-mail: aipingpeng71@163.com

References

Effect of NCMM in patients with vascular crisis after finger replantation


