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Original Article

Application of rehabilitation nursing in patients accepting minimally invasive spine surgery and its effects on pain and adverse emotions

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Abstract: Objective: To explore the significance of rehabilitation nursing (RN) after minimally invasive spine surgery (MISS), and to investigate its improvement on postoperative pain and anxiety/depression. Methods: A prospective study was conducted in 130 patients who underwent elective MISS. These patients were divided into two groups by the random number table method: control group (n=65, routine nursing mode) and research group (n=65, routine nursing and RN mode). Operation-related indicators, postoperative complications, pain, anxiety/depression, and quality of life were compared between the two groups. Results: Compared with the control group, the research group had significantly earlier off-bed activity after operation, significantly shorter length of hospital stay, lower total incidence of postoperative adverse reactions (all P<0.05) and significantly shortened latency to feeding (P<0.01). VAS scores at rest, and during turnover and cough after intervention were significantly lower in the research group than those in the control group (P<0.05, P<0.001, P<0.05). The SAS and SDS scores of the two groups after intervention were significantly lower than those before intervention (P<0.05 or P<0.01), and the reduction in the research group was more significant (P<0.001, P<0.01). The scores of Generic Quality of Life Inventory-74 (GQOL-74) in the research group were significantly higher than those in the control group one month after operation (all P<0.05). Conclusion: The application of RN in MISS can significantly relieve postoperative pain and adverse psychological emotions, reduce the risk of postoperative complications, shorten the length of hospital stay, and improve the quality of life.

Keywords: Rehabilitation nursing, minimally invasive spine surgery, pain, adverse emotions, quality of life

Introduction

Spinal disease, as a common clinical disease in spine surgery, can stimulate the nerves, spinal cord and blood vessels, and then induces the symptoms of lumbago and leg pain, leading to the occurrence of motor dysfunction and ultimately causing a serious impact on the patient's quality of life [1, 2]. Although it is not lethal, patient's daily life and quality of life will be greatly impaired without timely clinical treatment, and paralysis may even occur in severe cases [3]. At present, with the rapid development of medical technology, the treatment technique of spine surgery has made great progress, among which minimally invasive spine surgery (MISS) has become a common surgical method [4], and a main surgical method for treating diseases such as lumbar spondylolisthesis [5], spinal fracture [6] and suppurative spondylitis [7]. MISS inevitably leads to traumatic pain. Moreover, study has shown that patients after MISS have limited range of motion in the spine and surrounding tissues, which may affect the normal body function of the patients [8]; therefore, postoperative rehabilitation nursing (RN) is particularly important. Rehabilitation is a comprehensive and coordinated application of social, medical, vocational, educational and other measures to train and retrain the disabled. It aims to reduce the inconveniences caused by dis-

ability factors and improve the mobility, so that the disabled can basically take care of themselves and participate in social activities. In addition to the basic nursing, RN also includes the application of specialized nursing technology to help with the recovery of residual function in the patients. Due to postoperative pain and physical activity disorders, some patients may develop anxiety, even depression and other adverse psychological emotions [9, 10]. Up to now, RN is widely used in the postoperative recovery of stroke patients, but there are rare studies about the effects of RN on the psychological mood of patients. This study investigated the roles of RN after MISS in alleviating postoperative pain and relieving adverse psychological emotions, which adds information for postoperative rehabilitation of patients after MISS.

Materials and methods

General information

A prospective study was conducted in 130 patients with spinal lesions admitted to Zhuji Sixth People's Hospital from July 2018 to December 2019. All included patients were treated with MISS, and were divided into two groups by random number table: control group (n=65, routine nursing mode) and research group (n=65, routine nursing and RN mode). This study was approved by the Medical Ethics Committee of Zhuji Sixth People's Hospital.

Inclusion criteria: patients aged 18-70 years old; patients with lumbar disc herniation or thoracolumbar fracture confirmed by imaging examination; patients who underwent elective MISS; patients without surgical contraindications; patients with a normal sense to pain; patients who signed the informed consent.

Exclusion criteria: patients with coagulation dysfunction; patients with severe malnutrition; patients with heart, lung or kidney dysfunction or failure; patients with mental illness, unable to express normally; patients who were preoperatively diagnosed with malignancy; pregnant and lactating women.

Methods

The control group received routine nursing and the details are as follows. During hospitalization, blood pressure, heart rate and other vital signs were examined regularly; postoperative adverse reactions were tackled and routine medication instruction was followed.

In addition to routine nursing, RN measures were added in the research group. The details are as follows. (1) Preoperative communication: The efficacy of MISS was explained to patients before surgery, in order to enhance patients' confidence to control diseases, and lay a foundation for postoperative RN. (2) Posture care: After operation, patients were instructed to use a low pillow, lie in the supine position, and fix the surgical site, in order to avoid postoperative injury, and the patients should be moved smoothly. On the day after operation, the nursing staff or family member should assist the patients to turn over, and pay close attention to whether the patients had lip biting, frowning and other facial expressions. When the above facial expressions appear, the patients should be timely asked about the pain site, and analgesic drugs should be given when necessary. (3) Diet nursing: Six hours after operation, the diet could be resumed. Light taste was suggested to avoid the intake of spicy and irritating food, but to ensure the intake of food with high calcium, high protein and high energy. The correct way of cough and expectoration should be informed to the patient to avoid excessive pain. (4) Rehabilitation measures: On the day of operation, the patients were instructed to perform simple actions such as ankle pump and leg lifting, and the actions should be performed interactively for about 25 to 30 min. On the second day after operation, the patients were instructed to get out of bed, stand up and walk slowly, and the patient's safety should be ensured. The walking time was determined according to the pain degree of the patients, and was gradually increased in the later period. (5) Emotional nursing: After operation, the nursing staff should carefully observe and actively communicate with the patients to fully understand the changes of their psychological state. Once the patients appeared to have anxiety, irritability, depression or other adverse psychological emotions, the nursing staff should actively communicate with them, inform them of the results of the operation, and give them comfort and encouragement to the greatest extent to improve their confidence, so that they could strive to overcome the disease. (6) Nursing of complications: Early turnover or get-

Table 1. Comparison of baseline data ($\bar{x}$ ± SD, case)

	Research group (n=65)	Control group (n=65)	χ^2/t	P
Gender			0.770	0.380
Male	36	31		
Female	29	34		
Age (year)	48.7±5.4	47.9±6.2	0.784	0.434
Types of diseases			0.520	0.471
Lumbar disc herniation	42	38		
Thoracolumbar fracture	23	27		

ting out of bed was conducive to reduce the risk of complications such as venous thrombosis of lower extremity, pressure ulcers, etc. Possible postoperative complications should be paid special attention and timely treated.

Outcome measures

Primary outcome measures: (1) Visual analogue scale (VAS) was used to assess the pain degree of patients at rest, and during turnover and cough after intervention. And the pain degree increased with the increase of VAS score. (2) Self-rating anxiety/depression scale (SAS/SDS) was used to evaluate the anxiety and depression before and after intervention. SAS or SDS score ≥50 indicated that the patient was accompanied with anxiety or depression, and the degree of the corresponding symptom was serious with the increase of SAS or SDS score.

Secondary outcome measures: (1) The clinical indicators of operation were compared between the two groups. (2) Generic Quality of Life Inventory-74 (GQOL-74), involving social function, body function, material life status and psychological function, was used to evaluate patient's quality of life one month after operation. Higher GQOL-74 score indicated better quality of life. (3) The incidence of postoperative complications was recorded and compared between the two groups.

Statistical analysis

SPSS 20.0 was used to analyze the data. The counting data were represented as n/% and analyzed by chi-square test; Fisher exact probability method was used to analyze the data except for the total incidence. The measurement data were expressed as mean ± standard deviation ($\bar{x}$ ± SD); paired t test was used for intra-group comparison before and after intervention, and independent t test was used for comparison between groups. P<0.05 was considered statistically significant.

Results

Comparison of general information

There was no difference in the general information between the two groups, including gender, age and types of diseases (all P>0.05). See **Table 1**.

Comparison of operation-related indicators

Compared with the control group, the research group had significantly earlier off-bed activity (P<0.05) and feeding (P<0.01) after operation, and significantly shorter length of hospital stay (P<0.05). See **Table 2**.

Comparison of VAS scores

VAS scores at rest, and during turnover and cough after intervention were significantly lower in the research group than those in the control group (P<0.05, P<0.001, P<0.05). See **Table 3**.

Comparison of SAS and SDS scores before and after intervention

The SAS and SDS scores of the two groups after intervention were significantly lower than those before intervention (P<0.05 or P<0.01), and the reduction in the research group was more significant (P<0.001, P<0.01). See **Table 4** and **Figure 1**.

Comparison of life quality one month after operation

The scores of GQOL-74 in the research group, including social function, body function, material life status and psychological function, were significantly higher than those in the control group one month after operation (P<0.05, P< 0.001, P<0.01, P<0.001). See **Table 5**.

Comparison of postoperative complications

After operation, there were one case with wound infection, two cases with abdominal distention, and one case with lung infection

Table 2. Comparison of operation-related indicators ($\bar{x}$ ± SD)

	Research group (n=65)	Control group (n=65)	t	P
Time to do off-bed activity after operation (d)	6.77±1.34	7.28±1.50	2.044	0.043
Time to food taking (h)	7.98±1.66	8.95±1.92	3.081	0.003
Length of hospital stay (d)	14.47±3.22	15.87±3.05	2.545	0.012

Table 3. Comparison of VAS scores ($\bar{x}$ ± SD, score)

	Research group (n=65)	Control group (n=65)	t	P
At rest	3.55±1.04	4.02±1.10	2.503	0.014
Duration of turnover	4.08±1.20	5.33±1.36	5.556	<0.001
Duration of cough	5.38±1.43	6.04±1.55	2.523	0.013

Note: VAS, visual analogue scale.

Table 4. Comparison of SAS and SDS scores before and after intervention ($\bar{x}$ ± SD, score)

	Research group (n=65)	Control group (n=65)	t	P
SAS				
Before intervention	43.48±5.39	44.06±4.88	0.643	0.521
After intervention	34.06±4.40**	37.49±4.63**	4.329	<0.001
SDS				
Before intervention	40.06±5.44	39.60±4.70	0.519	0.607
After intervention	35.20±4.70**	37.89±5.05*	3.144	0.002

Note: Compared with before intervention, *P<0.05, **P<0.01. SAS, self-rating anxiety scale; SDS, self-rating depression scale.

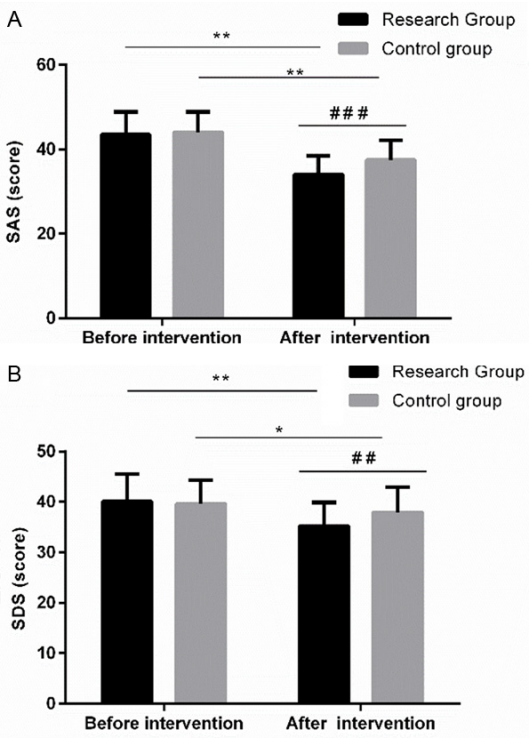

Figure 1. Comparison of SAS and SDS scores before and after intervention. A: Comparison of SAS score; B: Comparison of SDS scores. Compared with before intervention, *P<0.05, **P<0.01; compared between intra-groups after intervention, ##P<0.01, ###P<0.001. SAS, self-rating anxiety scale; SDS, self-rating depression scale.

in the research group; while there were two cases with wound infection, five cases with abdominal distention, two cases with venous thrombosis of lower extremity, one case with pressure ulcer and three cases with lung infection in the control group. Compared with the control group, the research group had significantly lower total incidence of postoperative adverse reactions (20.00% vs. 6.15%, P< 0.05). See **Table 6**.

Discussion

Although MISS has many advantages, such as small surgical incision and small trauma to surrounding tissues, it can cause obvious postoperative pain, and even affect the normal movement in severe cases [11]. Inappropriate postoperative care can also lead to the occurrence of complications such as venous thrombosis of lower extremity and wound infection [12, 13]. Therefore, it is of great significance to give reasonable nursing intervention measures to relieve postoperative pain and reduce the risk of complications.

A previous study [14] has shown that appropriate RN intervention after MISS can not only relieve postoperative pain, but also contribute to early postoperative functional exercise for patients. This study mainly carried out nursing intervention for patients undergoing MISS from six aspects, namely preoperative communication, posture care, diet nursing, rehabilitation

Table 5. Comparison of life quality one month after operation ($\bar{x}$ ± SD, score)

	Research group (n=65)	Control group (n=65)	t	P
Social functioning	50.06±5.20	48.09±4.04	2.412	0.017
Body functioning	56.90±6.49	52.17±5.32	4.544	<0.001
Material life status	65.50±6.49	62.47±5.28	2.920	0.004
Psychological function	63.08±6.40	57.60±5.86	5.091	<0.001

Table 6. Comparison of postoperative complications (n, %)

	Research group (n=65)	Control group (n=65)	t	P
Wound infection	1 (1.54)	2 (3.08)	0.000	1.000
Abdominal distention	2 (3.08)	5 (7.69)	0.604	0.437
Venous thrombosis of lower extremity	0	2 (3.08)	0.508	0.476
Pressure ulcer	0	1 (1.54)	0.000	1.000
Lung infection	1 (1.54)	3 (4.62)	0.258	0.612
Total incidence	4 (6.15)	13 (20.00)	5.482	0.019

measures, emotional nursing and nursing of complications. Postoperative pain status was fully recognized and appropriate analgesic treatment according to the specific situation was conducted. Movement of interactive leg lifting is conducive to the muscle atrophy caused by long-term bed rest after operation, and helps to restore the patient's body function as much as possible [15, 16]. The results of this study also confirmed that reasonable postoperative RN played an important role in reducing postoperative pain, shortening length of hospital stay and improving quality of life. The measures of RN intervention adopted in this study focused on the nursing of complications, including early detection and treatment of postoperative complications such as wound infection and venous thrombosis of lower extremity. And early turnover or getting out of bed as soon as possible was conducive to reduce the risk of complications such as venous thrombosis of lower extremity, pressure ulcers, etc. [17, 18]. It showed that compared with the control group, the research group had significantly lower total incidence of postoperative adverse reactions, suggesting that reasonable RN after MISS can effectively reduce the risk of postoperative complications.

Patients undergoing MISS are affected by postoperative pain and physical activity disorders, some patients with poor psychological bearing capacity may produce anxiety, irritability and other adverse psychological emotions [19, 20], and severe patients may develop depression [21]. Therefore, postoperative psychological counseling is also vital. There are few researches on adverse psychological status of patients after MISS. In this study, the philosophy of RN emphasized the patient's psychological nursing. Once the patients developed anxiety, irritability, depression or other adverse psychological emotions, the nursing staff should take reasonable measures immediately, actively communicate with them, and give them comfort and encouragement to eliminate their fear. In this study, SAS and SDS scores in the research group after intervention were significantly lower than those in the control group, indicating that reasonable postoperative RN can effectively relieve postoperative adverse psychological emotions.

However, limited number of cases was included in this study, thus the exact effects of rehabilitation measures on postoperative pain in patients should be further examined in a multicenter and large-sample study.

To sum up, reasonable RN after MISS can effectively reduce postoperative pain, relieve the adverse psychological emotions, reduce the risk of postoperative complications, shorten the length of hospital stay and improve quality of life.

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Disclosure of conflict of interest

None.

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