Scholar Publishing Group
International Journal of Public Health and Preventive Medicine
https://doi.org/10.38007/IJPHPM.2023.040106
ISSN 2789-8377 Vol. 4, Issue 1: 49-60

Exploration of Clinical and Rehabilitation Treatment Approaches for Spinal Cord Injury

Junfang He[1], Jianfeng Wang[1], Ming Jin[1], Jun Lv[2]

[1]*Department of Neurological Rehabilitation, Affiliated Hospital of Gansu University of Chinese Medicine, Lanzhou 730000, Gansu, China*

[2]*Department of Orthopedics, The First People's Hospital of Lanzhou New District, Gansu, China*

Keywords: Spinal Cord Injury, Rehabilitation Treatment, Effect Analysis

Abstract: Explore the clinical and rehabilitation treatment pathways for spinal cord injury. Sixty patients with spinal cord injury admitted to our hospital from January 2022 to December 2023 were selected and randomly divided into a control group and an observation group with 30 cases each. The control group received routine rehabilitation training, while the observation group received rehabilitation treatment on the basis of the control group. The advantages and disadvantages of the two groups were compared. Before intervention, there was no statistically significant difference in FMA scores and Barthel index between the two groups (P>0.05); After intervention, both groups had improved scores, but the FMA score and Barthel index in the observation group were higher than those in the control group (P<0.05). The hospitalization time and injury recovery time of the observation group were shorter than those of the control group (P<0.05). After intervention, the ASIA scores of both groups of patients significantly increased, and the ASIA scores of the observation group were significantly lower than those of the control group (P<0.05). After intervention, the HAMA anxiety score of both groups of patients significantly decreased, and the HAMA anxiety score of the observation group after intervention was significantly lower than that of the control group (P<0.05). The incidence of complications in the observation group was lower than that in the control group (P<0.05); After intervention, the compliance scores of both groups significantly increased, and the compliance scores of the observation group were significantly higher than those of the control group (P<0.05); The satisfaction of patients in the observation group was significantly higher than that in the control group (P<0.05). Effective clinical and rehabilitation treatment for patients with spinal cord injury has achieved significant clinical results, significantly improving their prognosis and quality of life.

Copyright: © 2023 by the authors. This is an Open Access article distributed under the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited (https://creativecommons.org/licenses/by/4.0/).

1. Introduction

With the overall development of countries around the world, the incidence of spinal cord injury has been continuously increasing year by year. Spinal cord injury is a common complication in patients with spinal fractures. Due to abnormal spinal cord structure and function, it often leads to severe limb dysfunction below the injured segment. Its main clinical manifestations include excretory dysfunction, disappearance of motor reflexes, and a high disability rate. Related studies suggest that incomplete spinal cord injury may also have residual dysfunction after treatment, while complete spinal cord injury can cause irreversible damage. Spinal cord injury not only causes serious physical and psychological harm to patients themselves, but also imposes a huge economic burden on the entire society[1]. With the continuous improvement of medical level, clinical diagnosis and treatment have made certain progress, such as performing surgical treatment on patients, first relieving compression, correcting deformities caused by trauma, and maintaining spinal stability, in order to promote postoperative neurological function recovery [2]. However, this treatment method cannot reverse the progression of spinal cord disease and restore spinal cord function. For example, most patients still have muscle atrophy, inability to take care of themselves, walking disorders, and other conditions after surgery, which increases the burden on families. According to relevant research [3], effective rehabilitation nursing measures are indispensable in the surgical treatment process of patients with spinal cord injury. The treatment path of clinical and rehabilitation nursing is a personalized treatment plan that develops a scientific and reasonable treatment plan based on the patient's own situation to treat spinal and spinal diseases, thereby improving efficacy and reducing treatment costs, and alleviating the patient's economic pressure. Therefore, this article aims to intervene in patients with spinal cord injury through rehabilitation therapy and observe its clinical effects. The following is the report.

2. Materials and Methods

2.1 General Information

Sixty patients with spinal cord injury admitted to our hospital from January 2022 to December 2023 were selected. Inclusion criteria: diagnosed with spinal cord injury through CT or MRI diagnosis; According to the ASIA 2011 spinal cord injury grading standard [4], all cases are incomplete spinal cord injuries; Age $\leqslant$ 70 years old; The patient has motor muscle dysfunction. Exclusion criteria: those with multiple severe systemic diseases; Individuals who interrupt treatment due to multiple factors; Patients with communication and mental disorders; Patients with coagulation function, liver and kidney dysfunction. According to the random table method, they were divided into a control group and an observation group with 30 cases each, with 20 males and 10 females in the control group; Age range from 30 to 68 years, with an average age of (47.37 ± 4.54) years; The course of the disease is 1-30 days, with an average of (15.18 ± 8.50) days; Spinal cord ASIA grading: 5 cases at level B, 15 cases at level C, and 10 cases at level D; Injury site: 12 cases of lumbar spine, 15 cases of cervical spine, and 3 cases of thoracic spine; Number of damaged segments: 15 cases in 1 segment, 5 cases in 2 segments, 5 cases in 3 segments, and 5 cases in 4 segments. There were 23 males and 7 females in the observation group; Age range from 30 to 70 years, with an average age of (48.10 ± 4.60) years; The course of the disease is 1-28 days, with an average of (15.69 ± 8.13) days; Spinal cord ASIA grading: 8 cases at B grade, 12 cases at C grade, and 10 cases at D grade; Injury site: 10 cases of lumbar spine, 18 cases of cervical spine, and 2 cases of thoracic spine; Number of damaged segments: 10 cases in 1 segment, 8 cases in 2 segments, 5 cases in 3 segments, and 7 cases in 4 segments. There was no statistical difference (P>0.05) in the comparison of basic information, age, and course of disease between the two groups of patients, and

it is clinically comparable.

2.2 Method

The control group received routine rehabilitation training, including anti infection treatment, pressure ulcer prevention care, rational use of neurotrophic drugs, etc., and guided patients to scientifically position and roll over. On the basis of the control group, the observation group adopts rehabilitation treatment methods as follows: ① Injury assessment: comprehensively grasp the degree of injury of the patient by inquiring about their medical history, imaging examination results, physical examination, etc., and judge the patient's prognosis as the main basis for the treatment plan. Imaging examinations include CT, MRI, X-ray examination, etc. Each examination technique has a different emphasis on observation, and the results of various examination techniques are combined to comprehensively evaluate the patient's condition Drug treatment: The occurrence and conduction of impulses in patients with spinal cord injury will be blocked, and the blood flow at the injury site will significantly decrease. The tissue will gradually be damaged over time due to ischemia and hypoxia. Therefore, timely medication is necessary for patients with spinal cord injury, which can minimize spinal cord injury, especially white matter injury, and has significant significance for the recovery of spinal cord function Surgical treatment: For patients with symptoms of nerve compression caused by spinal cord injury, timely surgery is necessary to relieve nerve compression, increase spinal stability, and reduce secondary spinal cord injury, which has significant significance for the later recovery of the spinal cord. The rehabilitation treatment path for patients with spinal cord injury includes the following points: ① Develop a rehabilitation plan: Rehabilitation for patients with spinal cord injury should start as early as possible, therefore, the patient should be evaluated based on their condition and actual situation, and a rehabilitation treatment plan should be developed in advance. Follow a gradual and orderly approach to rehabilitation treatment when the patient's condition is stable and physical conditions permit. ② Dietary rehabilitation treatment: Guide patients to eat foods with high nutrition, high fiber, and low residue to maintain unobstructed bowel movements Psychological regulation: mainly through supportive dialogue to alleviate the psychological pressure of patients; The purpose of health education is to enable patients to understand the extent of their spinal cord injury, and to have a targeted understanding of later care measures, so that patients can learn to monitor their own condition In terms of diet: It is recommended that patients consume foods rich in fiber and vitamins, abstain from spicy, greasy, stimulating, and hard foods, encourage patients to drink more water, and ensure smooth bowel movements. The recovery period mainly focuses on nourishing the liver and kidney, supplementing qi and blood with a diet. ⑤ Rehabilitation exercise: Patients with lumbar spine injuries above the plane receive hip joint flexion and traction training with the help of nursing staff, and actively roll over on their own in bed to improve their mobility. In the later stage, patients can be guided to use assistive devices for walking. ⑥ Bladder rehabilitation care: Urinary catheters should be replaced in a timely manner to prevent infection. Pull out the catheter in the later stage and perform intermittent catheterization for the patient in a timely manner. For patients with incontinence, indwelling catheterization with a urine collector can be used, and the use of suprapubic cystostomy should be avoided as much as possible.

2.3 Observation Indicators

(1) Two groups of daily living activity and motor function scores. The Barthel index was used to evaluate the patient's ability to perform daily activities, with a score of 0-100 points. The higher the score, the better it is; The Fugl Meyer assessment method (FMA) was used to assess the patient's

motor function, with a maximum score of 100 points. The higher the score, the stronger the motor function. (2) Count the hospitalization time and injury recovery time of two groups of patients. (3) Compare the incidence of complications between the two groups. This includes the incidence of constipation, bedsores, and urinary tract infections. (4) Comparison of pain scores between two groups. The visual analogue scale (VAS) was used for evaluation, with a total score of 0-10, where 0 indicates no pain, 10 indicates severe pain, and a higher score indicates more severe pain. (5) Neurological function assessment: Neurological function impairment and spinal injury association (ASIA) were used to evaluate the neurological function scores before and after treatment in two groups. The scale is divided into three parts: acupuncture sensation, light touch sensation, and motor sensation. The higher the score, the better the neurological function [5]. (6) Comparison of anxiety between two groups. Anxiety status was evaluated using Hamilton's Hamilton Anxiety Scale (HAMA) [6], which includes 14 aspects, ranging from "asymptomatic" to "extremely severe", with scores ranging from 0 to 4. If the score is above 29, it is a manifestation of severe anxiety; A score between 21 and 29 indicates significant anxiety; At a score of 14-21, it is a manifestation of anxiety; A score of 7-14 indicates the possibility of anxiety, while a score below 7 indicates the absence of anxiety symptoms. (7) Comparison of compliance and satisfaction between two groups. A self-made scale was used to evaluate patients' compliance and nursing satisfaction before and after treatment. The compliance scale was divided into 4 dimensions, with a total of 20 items. A 4-level scoring system was used, with a total score of 0-60 points. The higher the score, the stronger the compliance; The satisfaction scale is divided into 5 dimensions, each with 2 items, with a total score of 0-50 points. The higher the score, the better the satisfaction. The Cronbach'a coefficient is used for questionnaire reliability analysis, and it is generally believed that Cronbach'a The reliability of the 0.7 questionnaire is high. The Cronbach'a calculated by the compliance scale questionnaire is 0.856, while the Cronbach'a calculated by the satisfaction scale questionnaire is 0.834, indicating a high degree of consistency among the internal items in the questionnaire; Conduct questionnaire validity analysis using content validity evaluation.

2.4 Statistical Processing

Analyze using SPSS 20.0 software. The measurement data is described by ($\bar{x} \pm s$), independent sample t-test is used between groups, paired t-test is used within groups, and x2 test is used for counting data. P<0.05 indicates statistical significance.

3. Results

3.1 Comparison of Barthel Index and FMA Scores between Two Groups of Patients before and After Intervention

Comparison of FMA scores and Barthel index between the two groups before and after intervention: Before intervention, there was no statistically significant difference in FMA scores and Barthel index between the two groups (P>0.05); After intervention, both groups had improved scores, but the FMA score and Barthel index in the observation group were higher than those in the control group (P<0.05). See Table 1.

Table 1. Comparison of Barthel index and FMA scores between two groups of patients before and after intervention [($\bar{x} \pm s$), points]

group	Number of cases (n)	Barthel index		FMA rating	
		Before intervention	After intervention	Before intervention	After intervention
control group	30	52.34±5.34	68.45±5.46	49.45±4.24	74.34±7.34
Observers	30	52.55±5.35	85.45±7.56	49.56±4.88	87.34±8.34
t		0.152	9.985	0.093	6.409
P		>0.05	<0.05	>0.05	<0.05

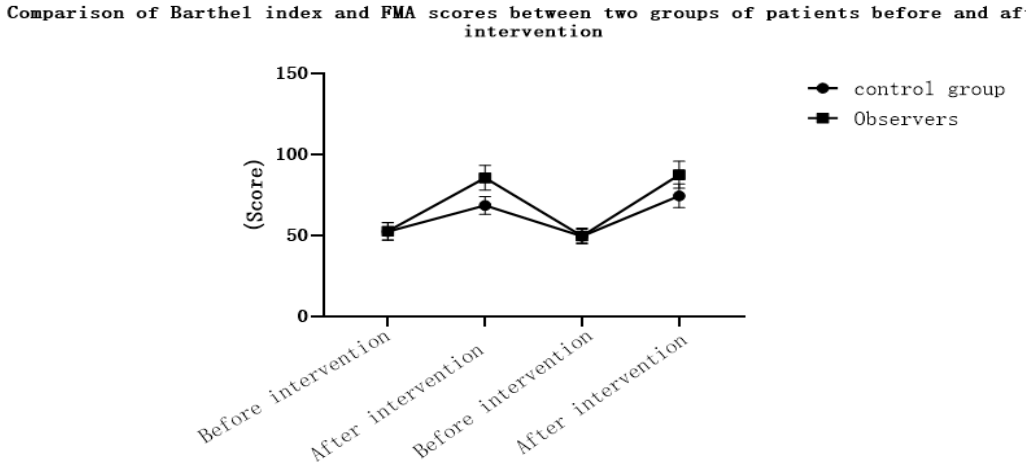

Figure 1. Comparison of Barthel index and FMA scores between two groups of patients before and after intervention

3.2 Comparison of Hospitalization Time and Injury Recovery Time between Two Groups of Patients

The hospitalization time and injury recovery time of the observation group were shorter than those of the control group (P<0.05). See Table 2.

Table 2. Comparison of hospitalization time and injury recovery time between two groups of patients [($\bar{x} \pm s$), d]

group	Number of cases (n)	hospital stay	Damage recovery time
control group	30	60.56±6.35	78.34±7.54
Observers	30	42.12±4.23	61.23±6.23
t		13.240	9.582
P		<0.05	<0.05

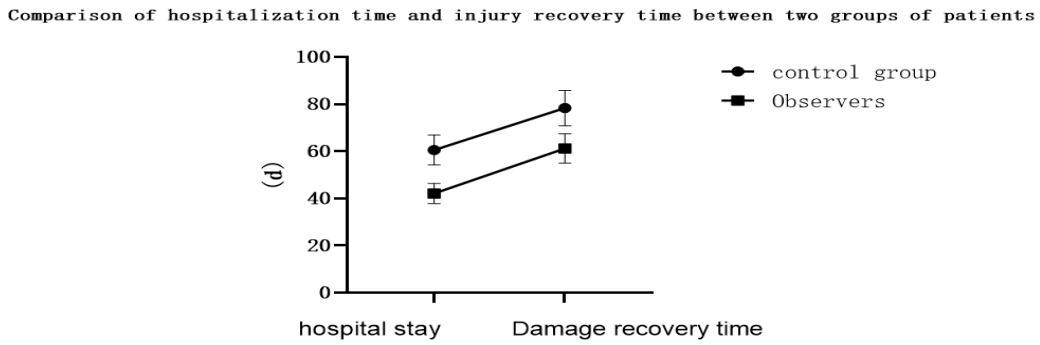

Figure 2. Comparison of hospitalization time and injury recovery time between two groups of patients

3.3 Comparison of Pain Scores between Two Groups of Patients

Before intervention, there was no statistically significant difference in VAS scores between the two groups of patients (P>0.05); After intervention, the VAS scores of both groups of patients significantly decreased, and the VAS scores of the observation group were significantly lower than those of the control group (P<0.05). See Table 3

Table 3. Comparison of pain scores between two groups of patients [($\bar{x} \pm s$), points]

group	Number of cases (n)	VAS scores	
		Before intervention	After intervention
control group	30	8.34±0.44	3.23±0.45
Observers	30	8.44±0.56	1.22±0.14
t		0.769	23.360
P		>0.05	<0.05

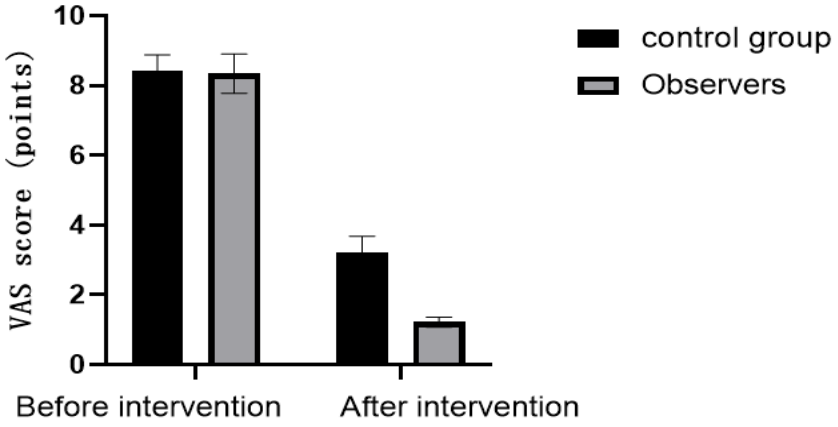

Figure 3. Comparison of pain scores between two groups of patients

3.4 Comparison of ASIA Scores between Two Groups of Patients before and After Intervention

Before intervention, there was no statistically significant difference in ASIA scores between the two groups of patients (P>0.05); After intervention, the ASIA scores of both groups of patients significantly increased, and the ASIA scores of the observation group were significantly lower than those of the control group (P<0.05). See Table 4

Table 4. Comparison of ASIA scores between two groups of patients before and after intervention [($\bar{x} \pm s$), points]

group	Number of cases (n)	Acupuncture sensation score		Light touch score		Motor score	
		Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
control group	30	59.32±10.32	65.78±6.34	58.45±8.32	64.24±7.23	59.34±8.23	65.34±6.34
Observers	30	60.23±11.23	73.23±5.34	57.89±7.99	73.34±5.24	60.23±7.23	73.34±5.34
t		0.327	4.923	0.266	5.582	0.445	5.286
P		>0.05	<0.05	>0.05	<0.05	>0.05	<0.05

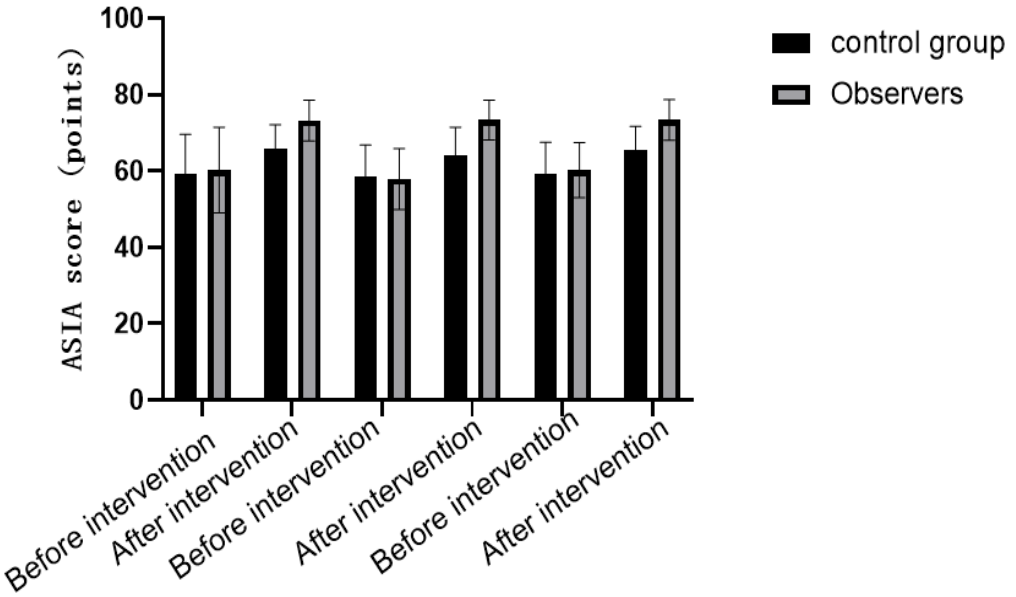

Figure 4. Comparison of ASIA scores between two groups of patients before and after intervention

3.5 HAMA Scores for 2 Groups of Patients

There was no statistically significant difference in HAMA anxiety scores between the two groups of patients (P>0.05); After intervention, the HAMA anxiety score of both groups of patients significantly decreased, and the HAMA anxiety score of the observation group after intervention was significantly lower than that of the control group (P<0.05). See Table 5

Table 5. HAMA scores of 2 groups of patients before and after intervention [($\bar{x} \pm s$), points]

group	Number of cases (n)	HAMA rating	
		Before intervention	After intervention
control group	30	23.23±3.23	15.55±3.45
Observers	30	23.45±3.44	10.22±3.33
t		0.255	6.088
P		>0.05	<0.05

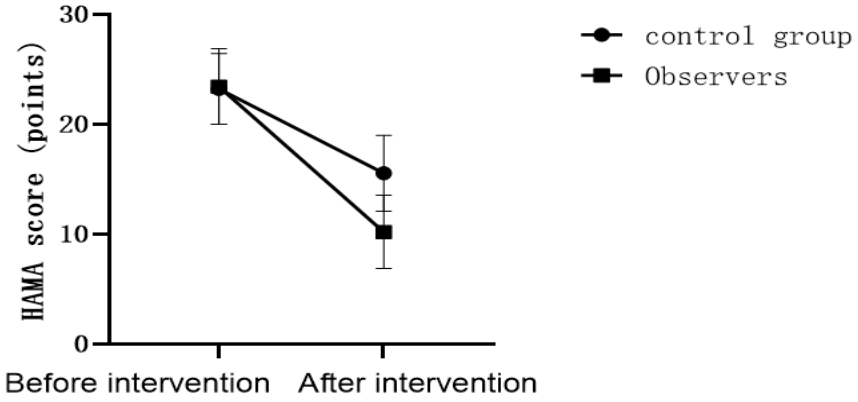

Figure 5. Comparison of HAMA scores between two groups of patients before and after intervention

3.6 Comparison of Complications between Two Groups of Patients

The incidence of complications in the observation group was lower than that in the control group (P<0.05), as shown in Table 6.

Table 6. Comparison of complications between two groups of patients (n,%)

group	Number of cases (n)	constipation	bedsore	urinary tract infection	incidence rate
control group	30	5	2	2	9(30.00)
Observers	30	1	1	0	1(3.33)
x^2					6.566
P					<0.05

3.7 Comparison of Compliance and Satisfaction between Two Groups of Patients before and After Treatment

Before intervention, there was no statistically significant difference in the compliance scores between the two groups of patients (P>0.05). After intervention, the compliance scores of both groups significantly increased, and the compliance scores of the observation group were significantly higher than those of the control group (P<0.05); The satisfaction of patients in the observation group was significantly higher than that in the control group (P<0.05). See Table 7

Table 7. Comparison of compliance and satisfaction between two groups of patients before and after treatment [($\bar{x} \pm s$), points]

group	Number of cases (n)	compliance		Satisfaction
		Before intervention	After intervention	
control group	30	42.34±1.34	48.45±3.46	35.45±4.24
Observers	30	42.55±1.35	55.45±3.56	45.56±4.88
t		0.605	7.723	8.566
P		>0.05	<0.05	<0.05

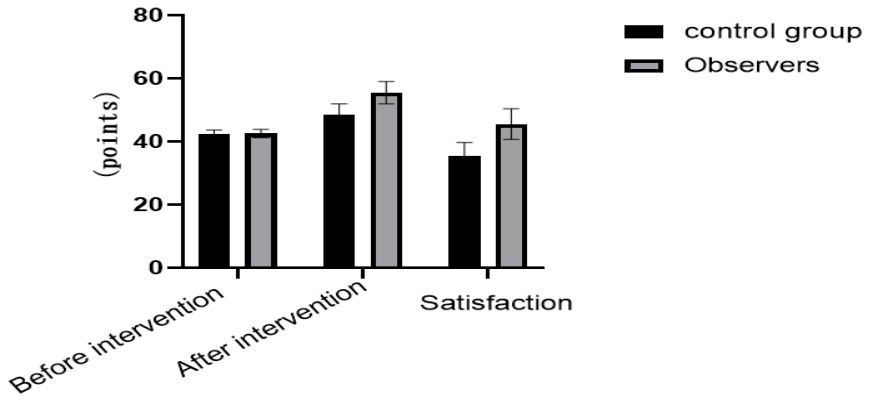

Figure 6. Comparison of compliance and satisfaction between two groups of patients before and after treatment

4. Discussion

With the further acceleration of modern medical development, the mortality rate of diseases is also further decreasing, and the survival rate of people is showing a trend of increasing year by year. In order to effectively improve the quality of life and the quality of life of patients, rehabilitation medicine has begun to receive increasing attention from the medical community. From the perspective of orthopedic patients themselves, in recent years, due to factors such as traffic accidents and work-related injuries, especially for patients who are disabled due to injuries, their quality of life is relatively low. This not only increases the burden on families, but also imposes a

heavy economic and health burden on society [7-8]. For patients, it is not only hoped that they can better alleviate their clinical symptoms, eliminate pain, effectively control their own diseases, but more importantly, restore their living ability and motor system function as much as possible, and return to normal life as soon as possible. Numerous investigations and studies have shown that rehabilitation plays an essential role in orthopedic patients, especially those with spinal cord injuries [9-10]. According to foreign research results, surgery is the most common treatment for patients with spinal cord injury; After the surgery, implementing early rehabilitation interventions for patients can not only effectively control their treatment costs, but also shorten their rehabilitation cycle. From the perspective of rehabilitation medicine and rehabilitation nursing research, compared to relevant research in China, this type of research in foreign countries started earlier and has a higher maturity in the development process. A relatively complete rehabilitation system has been established [11-12]. Especially for developed countries in Europe and America, the members of the rehabilitation team mainly reflect multidisciplinary characteristics, including not only conventional orthopedic doctors, rehabilitation physicians, physical therapists, language therapists, but also occupational therapists, orthopedic instrumentalists, social workers, and caregivers; The members of the rehabilitation team are jointly responsible for the diagnosis, treatment, rehabilitation, and evaluation of patients. Relevant personnel conduct joint consultations and rounds with patients, regularly discuss the situation of cases, and then construct rehabilitation treatment plans for patients. Usually, patients need to receive relevant education on surgical rehabilitation before officially starting surgical treatment, in order to effectively improve their psychological cooperation [13]. There is a relatively complete system in the process of evaluating the joint stability and range of motion of patients before surgery, which is of great significance for guiding the formulation of postoperative rehabilitation plans for patients.

The implementation of clinical pathways is a strategy adopted in the process of medical development in the face of constantly increasing medical costs. These pathways are used to provide a standardized medical service process, providing patients with high standards of medical services, while ensuring savings in medical costs. However, due to the diversity of diseases and the complexity of disease changes, each patient's treatment has its own specificity [14-15]. It is obvious that the purpose of clinical pathways is not to include all diseases and individuals in a set of standard treatment systems, but rather to common diseases with relatively simple conditions and courses. Based on this idea, the developed clinical pathway can have uniformity and be carried out according to standardized treatment procedures. The research results of this article found that the observation group had shorter hospital stay and injury recovery time compared to the control group, and the FMA score and Barthel index were higher than the control group. The incidence of complications was 3.33%, lower than the control group ($P<0.05$), indicating that the clinical rehabilitation treatment pathway is effective. The research results of Li Chunmin et al. [16] indicate that the clinical rehabilitation treatment pathway can help patients recover a certain degree of physical self-care ability, so the clinical rehabilitation treatment pathway can be promoted in the treatment of spinal cord. This is consistent with the research results of this article. Meanwhile, in this study, it was found that the VAS score of the observation group patients was significantly lower than that of the control group ($P<0.05$), indicating that the use of clinical rehabilitation treatment pathways also has a certain effect in alleviating patient pain. In addition, patients with spinal cord injury have a longer postoperative recovery time, which to some extent brings some psychological pressure to the patients. In the results of this study, it can also be found that the HAMA rating of the observation group patients is significantly lower than that of the control group ($P<0.05$), which also indicates that clinical rehabilitation treatment has reduced patients' anxiety to a certain extent and has played a certain role in their recovery. Analysis: Clinical rehabilitation therapy uses speech guidance to guide patients, helping them eliminate negative emotions such as irritability and anxiety,

and timely helping patients solve problems, thereby reducing their anxiety to a certain extent [17-18]. In addition, in the satisfaction survey results of patients, it was found that the compliance score and satisfaction score of the observation group were significantly higher than those of the control group ($P<0.05$). The analysis showed that the clinical rehabilitation treatment provided emotional and dietary guidance as well as comprehensive nursing care during the recovery period, and nursing interventions were carried out on the patients' mood and life, providing comprehensive guidance for their rehabilitation and improving their objective actions and behaviors, Effectively helping patients recover quickly, thereby improving their compliance and nursing satisfaction to a certain extent [19-20].

In summary, effective clinical and rehabilitation treatment for patients with spinal cord injury has achieved significant clinical results, significantly improving their prognosis and quality of life.

Funding

National Key Projects in the 14th Five-Year Plan of the National Health Commission (YYWS5120)

Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

References

[1]Anjum A, Yazid MD, Fauzi Daud M,et al. Spinal Cord Injury. Pathophysiology, Multimolecular Interactions, and Underlying Recovery Mechanisms. Int J Mol Sci. 2020,21(20):7533.

[2] Eli I, Lerner DP, Ghogawala Z. Acute Traumatic Spinal Cord Injury. Neurol Clin. 2021,39(2):471-488.

[3]Wang Xufei, Lv Enzhen, Yu Liying Clinical pathway design and efficacy observation for rehabilitation treatment of cerebral hemorrhage Family Medicine, 2018 (7): 127

[4]Chay W, Kirshblum S. Predicting Outcomes After Spinal Cord Injury. Phys Med Rehabil Clin N Am. 2020 ,31(3):331-343.

[5]Zhang Junwei, Hao Xiaoning, Yang Xiaohui, et al The application of magnetic resonance SWI technology in acute spinal cord injury and its evaluation of neural function Journal of Difficult Diseases, 2022-21 (5): 492-496

[6]Xing Zhen Observation on the effectiveness of clinical and rehabilitation treatment pathways for spinal cord injury Chinese Disability Medicine, 2016,24 (10): 114-115

[7] Ong B, Wilson JR, Henzel MK. Management of the Patient with Chronic Spinal Cord Injury. Med Clin North Am. 2020,104(2):263-278.

[8]Li X, Li M, Tian L,et al. Reactive Astrogliosis.Implications in Spinal Cord Injury Progression and Therapy. Oxid Med Cell Longev. 2020,2020:9494352.

[9] Deng J, Meng F, Zhang K,et al. Emerging Roles of Microglia Depletion in the Treatment of Spinal Cord Injury. Cells. 2022,11(12):1871.

[10]Ridlen R, McGrath K, Gorrie CA. Animal models of compression spinal cord injury. J Neurosci Res. 2022,100(12):2201-2212.

[11]Russo GS, Mangan JJ, Galetta MS,et al. Update on Spinal Cord Injury Management. Clin Spine Surg. 2020,33(7):258-264.

[12]Luo S, Xu H, Zuo Y, Liu X,et al. A Review of Functional Electrical Stimulation Treatment in Spinal Cord Injury. Neuromolecular Med. 2020,22(4):447-463.

[13]Nada EH, Ibraheem OA, Hassaan MR. Vestibular Rehabilitation Therapy Outcomes in Patients With Persistent Postural-Perceptual Dizziness. Ann Otol Rhinol Laryngol. 2019,128(4):323-329.

[14]Zhang Fangquan The implementation effect of clinical and rehabilitation treatment pathways for spinal cord injury Clinical Medical Research and Practice, 2017,2 (8): 89,91

[15]Hong Yunxia The effect of physical cooling therapy combined with rapid rehabilitation nursing pathway on pain and rehabilitation in patients with tibiofibular fractures Heilongjiang Medicine, 2022,46 (7): 860-862.

[16]Li Chunmin, Li Chunyan, Liu Hongli Analysis of clinical and rehabilitation treatment pathways for spinal cord injury Chinese Disability Medicine, 2019, 27 (3): 84-85

[17]Liu Cui The impact of rehabilitation pathway nursing on the prognosis of emergency stroke patients undergoing intermediate treatment Scientific Health Preservation, 2021, 24 (2): 150

[18]Zhou Huifang, Wang Jing, Wang Ge Evaluation of the effectiveness of clinical nursing pathways in the treatment and rehabilitation care of rheumatoid arthritis China Health and Nutrition, 2020,30 (2): 217

[19]Williams MW, Rapport LJ, Hanks RA,et al. Engagement in rehabilitation therapy and functional outcomes among individuals with acquired brain injuries. Disabil Rehabil. 2021 ,43(1):33-41.

[20]Wang Zhijun, Liu Yang, Yang Bin, et al Exploration of clinical and rehabilitation treatment pathways for spinal cord injury Electronic Journal of Clinical Medical Literature, 2020,7 (47): 69-70