

The Rehabilitation Effect of Rehabilitation Nursing Scheme for Sprinters With Knee Ligament Injuries

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ABSTRACT

Using the convenient sampling method, the control group and the observation group were established. The control group was given a routine nursing scheme, while the observation group was given rehabilitation nursing scheme. The difference of curative effect between the two groups were compared and the results were analyzed and summarized. Results of the quality of life scores of patients in the two groups were compared. The results showed that the quality of life score of the patients in the observation group were higher than that of the control group ($P < 0.05$); the satisfaction scores of patients was also compared. The results showed that the satisfaction scores of patients in the experimental group were significantly higher than that in the control group ($P < 0.05$), so the patients in the observation group are better than the control group. The rehabilitation nursing scheme has a certain effect on the rehabilitation of knee ligament injury of printing workers.

KEYWORDS

Ligament Injury, Knee Joint, Rehabilitation Nursing, A Sprinter

INTRODUCTION

With the improvement of people's living standards and the constant change of ideology, more and more people realize the importance of sports in keeping healthy and take part in various sports competitions in their spare time. Sprinting is the core of sports competition. The purpose of sprinting is to fully unleash the explosive power of the body in a short period of time, strive to achieve the highest speed, and maintain the continuity of that speed, striving to achieve the best results. Because the whole sprint is short, it can be understood as a sport that needs explosiveness and anti-pressure (Duan et al., 2023). In order to ensure the excellent results of sprinting, it is necessary to improve the physical fitness of athletes in an all-round way, including muscle strength, explosive force, agility and flexibility, and to enhance their physical fitness in an all-round way to adapt to the high-intensity sport of sprinting (Li & Liu, 2019). See Table 1 for 100 m performance and related indexes of elite printers at home and abroad.

DOI: 10.4018/IJHISI.338221

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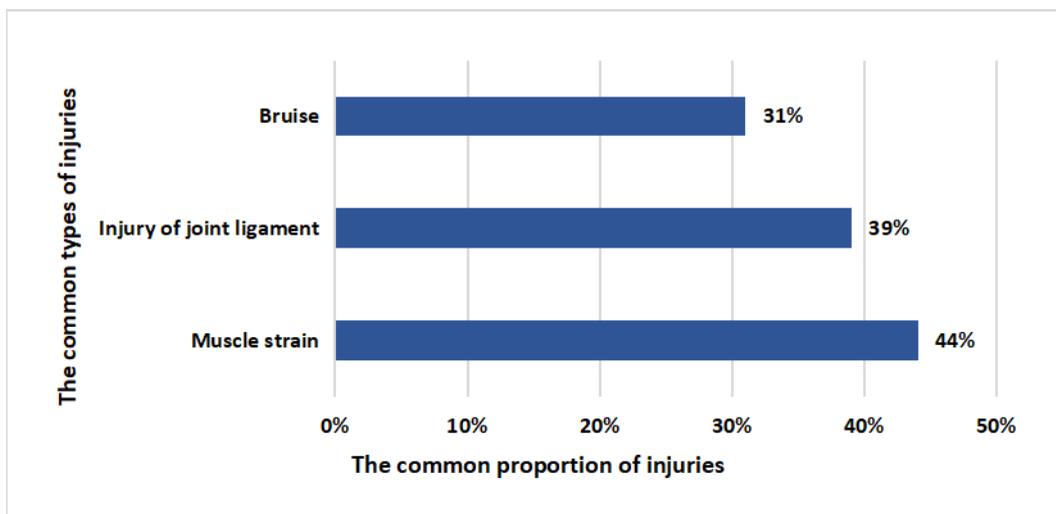
Table 1. Performance and related indexes of 100 m elite printers at home and abroad

Athlete	Achievement (s)	Height (m)	Step frequency (Hz)	Stride (m/step)	Relative step frequency (Hz)	Relative stride (m/step)
Green	9.79	1.80	4.65	2.20	8.37	1.22
Bailey	9.84	1.80	4.48	2.27	8.06	1.26
Surin	9.84	1.82	4.52	2.25	8.23	1.24
Bernal	9.85	1.78	4.31	2.35	1.67	1.32
Lewes	9.86	1.88	4.36	2.33	8.20	1.24
Bolton	9.86	1.75	4.60	2.20	8.06	1.26
Christy	9.86	1.89	4.40	2.28	8.27	1.23
Friedex	9.86	1.80	4.57	2.22	8.23	1.23
Carson	9.92	1.70	4.49	2.25	7.63	1.32
Itonhaus	10.00	1.81	4.54	2.20	8.22	1.22
Zhou Wei	10.17	1.80	4.51	2.18	8.12	1.22
Chen Wenzhong	10.20	1.78	4.95	1.98	8.81	1.12

The knee joint, which plays an important role in sprint, is the most important and complicated joint in the human body, with load-bearing function, and its stability will greatly affect the normal life of the human body (Prathap Kumar et al., 2020). Knee ligament injury is also known as knee ligament injury. It is commonly seen in Sports injury (figure 1), mainly manifested as pain, swelling and limited movement of the knee joint. When the knee ligament is injured, it needs Conservative management or surgical treatment according to the severity of the injury.

Ligaments in knee ligament injury refer to the ligaments around the knee joint, such as anterior cruciate ligament, medial collateral ligament, lateral collateral ligament, posterior cruciate ligament, medial patellar ligament, lateral patellar ligament, etc. Histological fibrosis appears earlier in knee

Figure 1. Common disease types of sports injuries

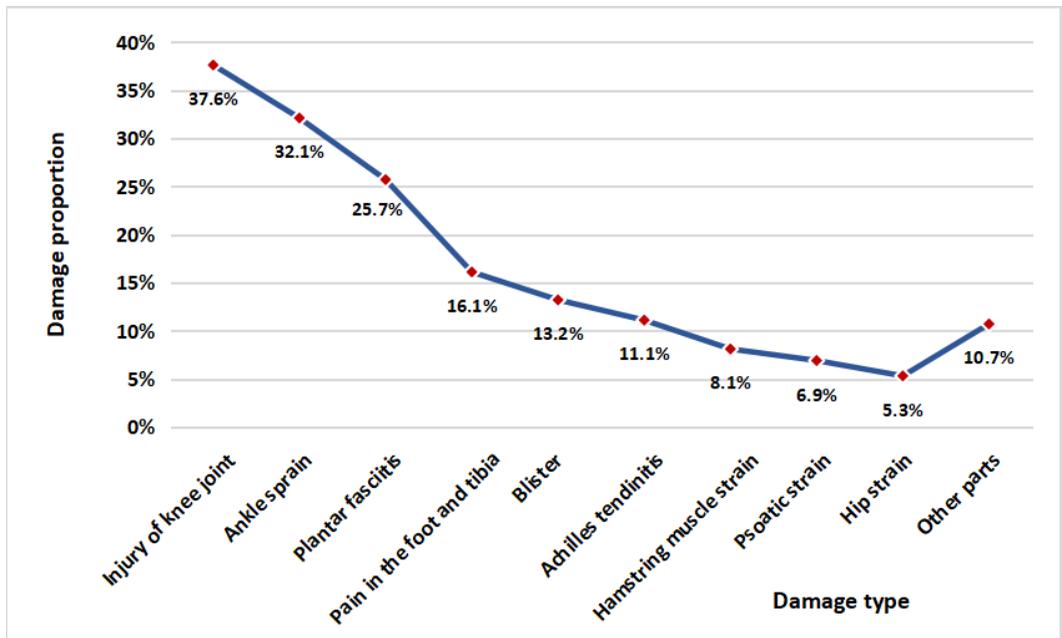


joint injury. People with knee ligament injury will not only lose the ability to walk normally, but also have symptoms of decreased self-control, which will greatly affect patients' daily lives (Choe & Kim, 2021). In order to restore the patient's limb function and prevent other abnormal situations from occurring, high-quality nursing services should be provided during the treatment period, which is very effective in patient recovery.

The most common cause of knee joint injury is high-energy trauma, such as adversarial sports, car accident injuries, etc., which usually manifests as pain, swelling, and movement disorders in the knee joint (Dulay et al., 2015). If the injury involves the rupture of one or more ligaments, it can manifest as instability of the knee joint. According to the location and severity of the injured tissue, the treatment methods of knee joint injury vary. If the above-mentioned symptoms appear after the injury, it is recommended to go to an orthopedic or sports medicine doctor or to the emergency room at a hospital as soon as possible (Doral et al., 2018). In addition to the above-mentioned reasons for knee joint injury, there are other inducing factors as well including (1) participating in activities on a terrain that is inappropriate for sports; (2) wearing unsuitable shoes or protective gear when exercising; (3) failing to warm-up before exercising; (4) participating in a single session of exercise that is too strenuous or increasing the intensity of exercise too suddenly. The types and proportions of injuries of printing workers are shown in Figure 2.

Reconstruction of knee ligament injury is one effective method for preventing and treating knee ligament injury in clinical medicine. However, after the operation, patients seem to show little recovery for various reasons (Rodrigues et al., 2012). Therefore, medical staff should provide effective care and management for patients and assist them in formulating efficient rehabilitation nursing programs. Through the rehabilitation nursing of patients with knee ligament injury, this paper discusses the rehabilitation effect of rehabilitation nursing program on patients with knee ligament injury.

Figure 2. Types and proportion of sprinter injuries



DATA AND METHODS

Clinical Data

A total of 100 cases of knee ligament injury from January 2023 to June 2023 were selected and divided into two groups. There were 50 cases in the control group with an average age of 34 years, and 50 cases in the observation group with an average age of 34.

Inclusion Criteria. (1) The patients' vital signs were normal; (2) there were no other complications; (3) all patients meet the surgical indications of knee ligament injury; and (4) there were no other diseases affecting the examination results.

Exclusion Criteria. (1) The patient is over 30 years old. (2) Patients and their families don't cooperate with researchers.

METHODS

In order to ensure the standardization of the experiment, the method of sampling was divided into control group and the observation group. The control group implemented a routine nursing plan, which included:

- strictly following the doctor's advice
- ensuring the appropriate temperature and humidity in the ward
- ensuring indoor ventilation
- providing reasonable dietary guidance for patients
- demonstrating to patients, before their operation, how to effectively follow the doctor's advice after their surgery (Liu et al., 2023).

This was done so that patients could understand the possible risks during the operation and be prepared. Patients' pre-operation index values such as body temperature were recorded, and patients were kept in a fasting state for 24 hours before their operations. After their operations, limbs were carefully observed for bleeding and medical dressings were changed for patients at the appropriate times.

In the observation group, the rehabilitation nursing plan was implemented: the patients were informed of the required fasting time for one day before operation, and the gastrointestinal tract was exhausted. After operation, the patients were instructed to carry out deep breathing training to prevent pneumonia and trained on how to defecate without getting out of their bed. The patients were instructed to prepare the items appropriately and shown how to maintain cleanliness When they defecated in bed.

Medical staff should always be trained to pay attention to whether the patient's wound dressing has symptoms such as infiltration, and whether it is accompanied by swelling and pain following their operation (Sibbald et al., 2003). They should also pay special attention to the skin temperature, chromaticity, toe movement, dorsal artery of foot, swelling, medical dressing, etc., and within six hours following the operation, patients should do ankle pump exercises, quadriceps femoris contraction exercises, and straight leg elevation exercises. These kinds of exercises are conducive to the quick recovery of patient function and promote the blood circulation system of the affected limb (Xing et al., 2018). Patients should be guided on strategies to alleviate limb swelling and pain caused by the disease. Instruct patients to use crutches regularly (Majmudar et al., 2014). Kneeling exercises can be performed six to seven days after the operation for twice a day. At the same time, it is necessary to apply ice to the knee bone to reduce bleeding in the affected area, and inform the patient to adhere to the exercise program conducted within six hours of surgery to prevent adhesion between the knee muscle and the human bone, which may endanger the patient's future normal walking ability. Patients with phlegm in their lungs need assistance to discharge phlegm as soon as possible, so it

does not affect breathing. If necessary, consider administering atomizing drugs to relieve coughing and moisten lungs (Ye et al., 2020). Within one week after surgery, patients need to meet the massage needs for osteoarthritis in the arms and feet. Medical staff need to guide patients in foot flexion and extension training, leg lifting training, lower limb support training, and balance training. (Chang, 2020). Two weeks after surgery, patients should undergo weightlifting, passive flexion and extension, and reciprocating exercise training. (Bousquet et al., 2018). Patients should be instructed to train quadriceps femoris within two to three months after their operation and carry out weight training using the NET method for improve upper and middle tensile strength at the same time. Walking should be done with a walking stick, gradually getting rid of the walking stick, when they can stand alone or can carry out squat training.

Due to symptoms and injuries in the patient's body, negative emotions such as anxiety, depression, resistance, and treatment discomfort may occur. Therefore, medical staff should use a more friendly and stable tone in their communication with patients. If necessary, correct psychological guidance should be given to patients before discharge.

Rehabilitation Nursing

Basic Nursing Care

Guide patients to develop good hygiene habits, and people with physical disabilities need to help with personal hygiene. Keep the ward quiet, clean, ventilated and sunny, with appropriate temperature and humidity, and open doors and windows regularly for ventilation (pay attention to keep the patient warm during ventilation to prevent catching a cold).

General Nursing

- (1) According to routine nursing of rehabilitation nursing.
- (2) Make sure the patient gets rest, cover the affected limb, redress it when necessary, and restrict activities.
- (3) Observe the injury, take records of observations, observe the degree of pain, swelling, and dysfunction of the injured part, observe any changes in vital signs, visit the doctor when necessary, and report to the doctor in time if there is any abnormality.

Pain Care

Give painkillers according to the doctor's advice and inform them of their functions, side effects, usage, dosage, and adverse reactions. Physiotherapy and acupuncture practitioners should be informed of the usage, function, and corresponding precautions (McDowell et al., 2019). Medical staff need to grasp the time, process, and degree of discomfort of the patient's injury in order to better assist the patient in choosing a suitable sleeping position. Inquire if the patient has an allergic constitution. Inquire if the patient has suffered from hematological disorders, especially those with coagulation disorders. Inquire if the patient has a history of mental system diseases. Inquire if the patient has serious organic lesions on important organs and if there is a history of chronic diseases such as diabetes.

Diet

- (1) Give the patient foods rich in cellulose, keep the stool unobstructed, and avoid spicy food. In the daily diet, suggest light and digestible foods as the main foods, recommend more high-protein foods such as vegetables, fruits, and milk, and try to avoid those foods that can aggravate the stomach that would prevent the body from absorbing nutrients.
- (2) The patient may eat some medicated diet to regulate the body. When doing dietotherapy, add some Chinese medicines, such as Lycium barbarum and Angelica sinensis, which can promote the recovery of wounds and have a good conditioning effect on the human body.
- (3) Eat foods rich in calcium. The main component of human bones is calcium,

so once the joints are damaged, patients should eat more food containing calcium, which will not only promote the recovery of bones, but also strengthen their health. In addition, some patients can take calcium tablets to make up for calcium deficiency quickly, but the specific dosage of calcium tablets should be determined according to the doctor's advice. (4) Eat more light and digestible foods, such as fresh fruits, vegetables, bone soup, etc., so the stomach will absorb more nutrients and promote the recovery speed of the wound. In addition, you can also add some Chinese medicines for promoting blood circulation and removing blood stasis to food to make a medicated diet, which will not only regulate the patient's body, but also promote the recovery of the disease.

Psychological Nursing

When patients have emotional instability, insomnia, poor breathing, and other uncomfortable symptoms due to illness, pain, or other unknown reasons, they should be given psychological counseling as soon as possible to encourage the patients' commitment to administer self-treatment and to improve confidence in their treatment. At the same time, we should closely cooperate with efficient body balance training and use drugs and acupuncture therapy reasonably and effectively according to the needs of patients. We understand that patients want to relieve pain and discomfort as soon as possible. Therefore, we tell them the way, efficacy, risks, and advantages of surgery, from the patient's point of view, and introduce the details and remarkable effects of surgery in China in detail, so as to fully meet the needs of patients and their families and help them eliminate their inner anxiety and doubts. At ordinary times, we pay attention to individual differences at work, understand the psychological state of patients according to their personalities, and give sincere and patient advice. We should adopt an approachable attitude and be considerate with communication methods to help patients open their minds and restore their physical and mental health. To sum up, psychological nursing is different from general preoperative nursing, which is characterized by the need to pay attention to the words and deeds of nurses and consciously consider the feelings of patients to understand their emotional changes (Perrotta, 2020). Combining the theoretical knowledge and actual situation before and after operation, we try our best to solve problems for patients, adjust their behavior and psychological discomfort, reduce their psychological burden and anxiety, and achieve the purpose of adjuvant treatment of diseases, speeding up rehabilitation and improving mental health.

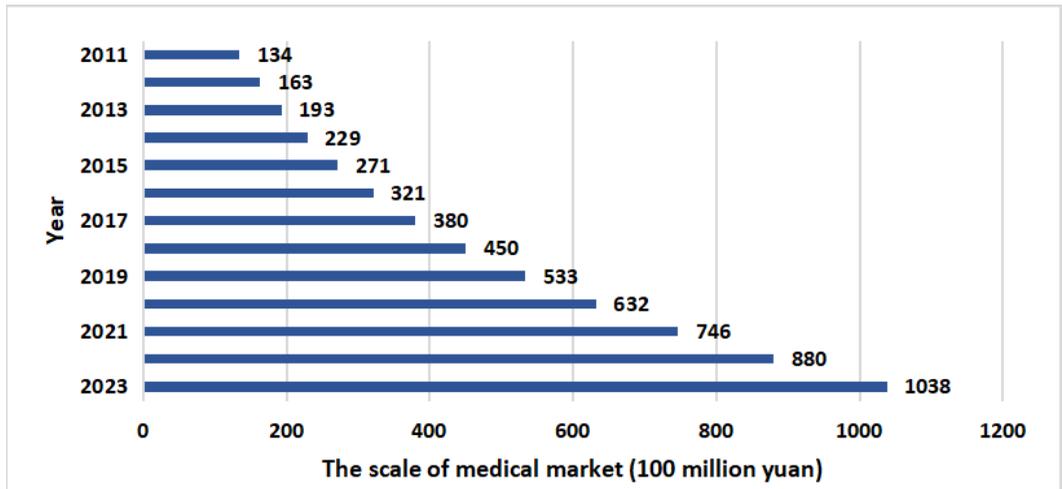
Discharge and Health Guidance

Knee joint injury not only affects physical health, but also has a negative impact on mental health. Surgical treatment of a knee joint injury has a short recovery period and little physiological impact on kneecap stability and has gradually become the best method to treat knee joint injury. To ensure the smooth progress of the surgery, good psychological care and careful preparation are required before the surgery. After surgery, careful observation, joint function rehabilitation exercises, and correct discharge guidance are required. In the rehabilitation stage, it is necessary to strengthen the patient's rehabilitation knowledge and cultural education, master appropriate systematic training methods, communicate in a timely manner with doctors about nursing diagnosis problems during the rehabilitation process, adjust treatment plans, effectively prevent symptoms such as joint adhesion and muscle atrophy, repair joint functions, and promote early recovery of patients. The forecast of rehabilitation medical market in China from 2011 to 2023 is shown in Figure 3.

FORECAST OF THE MARKET SIZE TREND OF REHABILITATION MEDICAL CARE IN CHINA FROM 2011 TO 2023

Rehabilitation nursing should avoid rushing for success in the early stage, and at the same time, relevant measures related to treatment should be introduced in detail. After discharge, patients should be informed that they need to continue their rehabilitation training during hospitalization. This is

Figure 3. Forecast of the rehabilitation medical market in China 2011-2023



good for keeping the knee joint warm and cold and is also good for blood circulation. Patient should be urged to keep a positive and optimistic mood and exercise their lower limbs as required. If the patient can bear the load, they can start training with such exercises as squatting and knee rotation to improve mobility of the knee joint and gradually restore its function. This exercise should be done until the joint pain subsides and the lower limbs function properly and the patient can walk normally. In addition, the patient should also pay attention to their diet and dietary structure, mainly focusing on eating foods in moderation that are high in protein, high in calories, rich in vitamins, and digestive AIDS (McClements, 2020). The patient should take their medicine on time according to the doctor's advice and follow up with their doctor regularly (Yu et al., 2019). Before intense activities or outdoor activities, the patient should prepare in advance; when lowering the head and lifting heavy objects, they must use the correct posture and method (Kehl et al., 2017); In order to prevent over exertion, proper training according to one's own situation to prevent accidents and injuries should be given. The patient must pay attention to safety issues and pay attention to every detail that affects safety. Additionally, movable support should be worn strictly for three months to prevent a repeat injury of the ligament. Finally, the patient should strengthen muscle endurance and knee flexion and extension and begin basic swimming and cycling four months after surgery. These movements can help the joints become more flexible.

Evaluation Indicators

The scores of qualities of life and patient satisfaction were compared between the two groups.

The quality of life scores between the control groups are based on the quality of life of patients, including physiological function, physical pain, mental health, social function, and emotional function (Bakhshani et al., 2015). Patient satisfaction score statistics is the statistics of patients' satisfaction with the process, and its satisfaction can be divided into satisfaction, basic satisfaction, and dissatisfaction.

Statistical Methods

The statistical analysis was carried out by SPSS 19.0, and the measurement data were described by S, and the comparison between groups was made by T test ($\alpha = 0.05$). The technical data were described by frequency and composition ratio, and the comparison between groups was made by X^2 ($\alpha = 0.05$).

RESULTS

Comparison of Quality of Life Between Two Groups

The quality of life scores between the two groups of patients were compared. The results showed that the quality of life scores in the observation group were higher than those in the control group ($P < 0.05$), as shown in Table 2.

Comparison of Nursing Satisfaction Between the Two Groups

Comparing patient satisfaction scores, the results show that the scores for patients' satisfaction with nursing in the experimental group were significantly higher than those in the control group ($P < 0.05$), as shown in Table 3.

ANALYSIS OF RESULTS

After comparing the quality of life and patient satisfaction rate between the two groups ($P < 0.05$), the data showed significant differences in the quality of life and nursing satisfaction of patients in the observation group. Thus, it is necessary for patients with knee ligament injury to have rehabilitation nursing. A high-quality nursing health management plan will not only improve the effects of treatment but will also relatively alleviate adverse physiological aspects for patients, namely pain in all parts of the body and the mental stress, so they can maintain a complete social consciousness and build an emotional bridge, which is helpful in improving the quality of life for patients.

In the research of rehabilitation nursing plans, timely relief of pain and swelling is required after knee joint injury. (Zhu & Gao, 2022). For example, when a patient suffers from knee joint injury, rest and cold compression should be carried out immediately to prevent the knee joint from being extruded, coiled with gauze, or reduced in size, and to encourage and help the patient to properly carry out a recovery plan within a few weeks. A recovery plan can reduce the swelling and pain in the patient's body, improve muscle fibers, and restore the patient to their previous health as soon as possible (Shaw, 2017).

Table 2. Quality of life scores between comparison groups

Group	Number of cases	physiological function	Physical pain	Mental health	Social function	Emotional function
control group	50	53.69±2.36	54.96±2.14	58.64±5.98	79.25±1.84	74.36±2.36
Observation group	50	62.55±2.47	63.97±2.25	68.84±5.06	85.94±1.48	82.67±2.51
<i>t</i>	-	28.240	30.651	10.834	17.693	20.888
<i>P</i>	-	<0.05	<0.05	<0.05	<0.05	<0.05

Table 3. Statistics of patient satisfaction score

Group	Number of cases	Satisfied	Basically satisfied	Dissatisfied	Total satisfaction number
control group	50	28(56.00)	11(22.00)	11(22.00)	39(78.50)
Observation group	50	33(66.00)	13(26.00)	4(8.00)	46(92.00)
χ^2	-	-	-	-	4.152
<i>P</i>	-	-	-	-	<0.05

This physical therapy method can effectively treat knee ligament injuries, especially for patients who require low exercise intensity and those who need to practice low knee joint tolerance. If the following conditions occur, the doctor is likely to propose surgery: the knee joint not only has tendon or chemical fibrocartilage tissue damage but also can cause knee joint bending in daily life. In the rehabilitation of knee ligaments, the surgeon will remove the damaged ligaments and replace them with prosthetic ligaments. Note that the prosthetic ligaments here are similar to ligaments, connecting muscle fibers and musculoskeletal structures. This type of replacement structure is also known as a graft, which is a ligament that medical staff can refer to when removing a part of the patient's pathological knee joint. After a successful surgery, the patient will undergo the next course of rehabilitation training.

CONCLUSION

The injury of the knee ligament will lead to instability of the knee joint, and even seriously affect the normal operation of the knee joint. Even if extreme surgical treatment is adopted, if the postoperative rehabilitation training is not timely and thorough, the operation will not achieve the expected effect (Ma et al., 2021). Therefore, under the premise of ensuring the stability of ligament repair, appropriate rehabilitation nursing should be carried out, and patients should be guided to carry out planned and phased rehabilitation training, so that the basic function of knee joint can be restored to normal and meet the needs of daily life and work.

Multi-ligament injury of knee joint refers to the fracture or injury of various ligaments in the knee joint, which seriously affect the normal life of patients by damaging other structures in the human knee joint (Niu & Yan, 2022). Therefore, active and effective treatment of knee ligament injury is very important in clinical nursing. At present, the clinical observation of knee ligament injury is usually cervical surgery, but usually the postoperative rehabilitation effect is not obvious, so we should carry out corresponding rehabilitation nursing in future work.

After knee joint multi-ligament repair, postoperative rehabilitation nursing can promote joint function repair to the greatest extent and improve the actual effect of surgical treatment (Guan et al., 2021). Therefore, it is necessary to formulate an appropriate rehabilitation plan according to the characteristics of ligament injury to improve the postoperative rehabilitation effect. In the course of rehabilitation training, it is necessary to train thigh muscles and traction reflex, but attention should be paid to avoid premature training and instability. For patients with lateral structure injury, active training is needed. Medical staff should supervise and guide them, and a scientific and standardized support frame should be selected to ensure that it will not be used for three months after operation. Under the effective guidance of medical staff, certain training can improve patients' treatment compliance, stimulate patients' self-confidence in overcoming disease, and promote the rapid recovery of joint function (Yao et al., 2023). When the joint is stable and can accept the current training intensity, the training difficulty coefficient can be increased appropriately to promote the flexibility of the joint and achieve the rehabilitation effect of rapid repair.

CONFLICT OF INTEREST

The authors of this publication declare that there are no competing interests.

FUNDING STATEMENT

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors. Funding for this research was covered by the authors of this article.

ACKNOWLEDGMENT

The authors would like to show sincere thanks to those techniques who have contributed to this research.

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