EFFECTS OF FUNCTIONAL TRAINING ON POSTOPERATIVE ANTERIOR CRUCIATE INJURY IN ATHLETES HOSPITALIZED

ORIGINAL ARTICLE
ARTIGO ORIGINAL
ARTÍCULO ORIGINAL

EFEITOS DO TREINAMENTO FUNCIONAL HOSPITALAR NO PÓS-OPERATÓRIO DO CRUZADO ANTERIOR EM ATLETAS

EFECTOS DEL ENTRENAMIENTO FUNCIONAL INTRAHOSPITALARIO EN LA LESIÓN POSTOPERATORIA DEL CRUZADO ANTERIOR EN ATLETAS

Fengjuan Zhang[1]
(Physical Education Professional)
Chunli Wang[1]
(Physical Education Professional)
Xiaoyong Chen[1]
(Physical Education Professional)
Huiyan Li[1]
(Physical Education Professional)

1. Sanya University, Sanya, Hainan, China.

Correspondence:
Chunli Wang
Sanya, Hainan, China. 572022.
wangchunli5@126.com

ABSTRACT

Introduction: Anterior cruciate ligament rupture is a common clinical sports injury, and its incidence has an increasing tendency. The understanding by nurses of the best practices in the postoperative period of various surgeries has contributed to the early return of patients to their activities. Therefore, there is an urgent demand for optimizing the hospital protocol for the postoperative stage. Objective: Optimize perioperative nursing care and postoperative functional exercises in sports ligament injuries. Methods: Thirty patients (18 males, age 29.2±8.7 years) with knee cruciate ligament injury admitted to Sanya University Hospital from January to December were selected. Three to five days after admission, based on a regular physical and chemical examination and cruciate ligament reconstruction surgery under epidural anesthesia. Prevention care for postoperative complications, monitoring of vital signs and alternating position on the stretcher, mobilizations, and pain care were detailed. According to the Lysholm and Tegner activity scales, evaluation was made in the functional loss and level of recovery caused by the knee ligament injury. Results: The hospital stay in this group was 12 to 43 days, with a mean of (25.4±8.6) days. After two months of follow-up, 11 cases showed excellent functional recovery, 17 cases of functional recovery were good, the excellent and good index was 93.3%. After six months of follow-up, all patients in this group returned to work and normal life. Conclusion: Optimized treatment with functional training in the post-surgical period, good care, and adapted exercises are of great importance for the brief recovery of a sports function. ***Evidence Level II; Therapeutic Studies – Investigating the results.***

Keywords: Anterior Cruciate Ligament; Nursing Process; Rehabilitation Nursing.

RESUMO

Introdução: A ruptura do ligamento cruzado anterior é uma lesão clínica esportiva comum e sua incidência tem uma tendência crescente. A compreensão pelas enfermeiras sobre as melhores práticas no pós-operatório de várias cirurgias tem colaborado para o retorno precoce dos pacientes às suas atividades. Urge a necessidade de uma otimização no protocolo hospitalar para esse pós-cirúrgico. Objetivo: Otimizar as condutas de enfermagem perioperatória e os exercícios funcionais pós-operatórios das lesões ligamentares esportivas. Métodos: Trinta pacientes (18 homens, idade de 29.2±8.7 anos) com lesão do ligamento cruzado do joelho internados no hospital da Universidade Sanya entre janeiro a dezembro foram selecionados. Decorridos 3 a 5 dias após a admissão, com base em exames físicos e químicos regulares, e cirurgia de reconstrução do ligamento cruzado sob anestesia peridural. Foram detalhados os cuidados de prevenção para complicações no pós-operatório, monitoramento de sinais vitais e alternância de posição na maca, mobilizações e cuidados com a dor. A debilidade funcional e o nível de recuperação causados pela lesão ligamentar do joelho foram avaliados de acordo com a escala de pontuação de Lysholm e a escala de atividade de Tegner. Resultados: A permanência hospitalar nesse grupo foi de 12 a 43 dias, com uma média de (25,4±8,6) dias. Após 2 meses de acompanhamento, 11 casos mostraram excelente recuperação funcional, 17 casos de recuperação funcional foram bons, o índice excelente e bom foi de 93,3%. Depois de 6 meses de acompanhamento, todos os pacientes desse grupo voltaram ao trabalho e à vida normal. Conclusão: O tratamento otimizado com treinamento funcional no pós-cirúrgico, bons cuidados e exercícios adaptados são de grande importância para a breve recuperação da função esportiva. ***Nível de evidência II; Estudos Terapêuticos - Investigação de Resultados.***

Descritores: *Ligamento Cruzado Anterior; Processo de Enfermagem; Enfermagem em Reabilitação.*

RESUMEN

Introducción: La rotura del ligamento cruzado anterior es una lesión deportiva clínica común y su incidencia tiene una tendencia creciente. El conocimiento por parte de las enfermeras de las mejores prácticas en el postoperatorio de varias cirugías ha colaborado a la pronta vuelta de los pacientes a sus actividades. Urge la necesidad de una optimización en el protocolo hospitalario para este postoperatorio. Objetivo: Optimizar los cuidados de enfermería perioperatorios y los ejercicios funcionales postoperatorios en las lesiones ligamentosas deportivas. Métodos: Se

seleccionaron treinta pacientes (18 varones, con una edad de 29,2±8,7 años) con lesión del ligamento cruzado de la rodilla ingresados en el Hospital Universitario de Sanya de enero a diciembre. De tres a cinco días después del ingreso, según el examen físico y químico regular, y la cirugía de reconstrucción del ligamento cruzado bajo anestesia epidural. Se detallaron los cuidados de prevención de las complicaciones postoperatorias, la vigilancia de las constantes vitales y la alternancia de posición en la camilla, las movilizaciones y los cuidados del dolor. La debilidad funcional y el nivel de recuperación causados por la lesión del ligamento de la rodilla se evaluaron según la escala de puntuación de Lysholm y la escala de actividad de Tegner. Resultados: La estancia hospitalaria en este grupo fue de 12 a 43 días, con una media de (25,4±8,6) días. Tras 2 meses de seguimiento, 11 casos mostraron una excelente recuperación funcional, 17 casos de recuperación funcional fueron buenos, el índice de excelente y bueno fue del 93,3%. Tras 6 meses de seguimiento, todos los pacientes de este grupo volvieron al trabajo y a la vida normal. Conclusión: El tratamiento optimizado con entrenamiento funcional en el periodo postoperatorio, los buenos cuidados y los ejercicios adaptados son de gran importancia para la breve recuperación de la función deportiva. ***Nivel de evidencia II; Estudios terapéuticos - Investigación de resultados.***

Descriptores: *Ligamento Cruzado Anterior; Proceso de Enfermería; Enfermería en Rehabilitación.*

DOI: http://dx.doi.org/10.1590/1517-8692202228052022_0040 Article received on 01/28/2022 accepted on 02/11/2022

INTRODUCTION

Anterior cruciate ligament injury of the knee is a common and more serious knee sports injury, department of common diseases in the field of sports and rehabilitation medicine,[1] improper treatment can easily lead to knee instability, damage to articular cartilage and meniscus, even the occurrence of secondary osteoarthritis,[2] severely affect the functional activities of the knee joint, significantly reduce the quality of life of patients. At present, arthroscopic reconstruction of the anterior cruciate ligament is often used clinically, arthroscopic anterior cruciate ligament (ACL) reconstruction is the preferred method to improve joint instability after rupture of the knee joint anterior cruciate ligament,[3] this technique can accurately restore the stability of the knee joint, it has the advantages of small surgical trauma, short operation duration, and quick postoperative recovery.[4] Effective postoperative rehabilitation training can further consolidate the efficacy of surgery, promote the recovery of knee joint function of patients, however, non-standard functional exercise will cause the ligaments to be loose or elongated after reconstruction, even break, so that the ligaments can't perform their proper function, directly affect the effect of surgery.[5] Therefore, early rehabilitation training is very important. Water exercise therapy can improve the rehabilitation effect of knee osteoarthritis.[6]

METHOD

Experimental subjects

Thirty patients with knee cruciate ligament injury admitted to our hospital from January to December were selected. Among them, 18 were male patients, 12 female patients; They were 18 to 46 years old, with an average age of (29.2±8.7) years old. 19 cases of simple anterior cruciate ligament injury, 8 cases of combined posterior cruciate ligament injury, there were 3 cases with injuries of the medial and lateral collateral ligaments. All patients have a history of trauma, no circulatory, respiratory, or endocrine diseases. (Table 1)

Nursing

Most of them are young patients with sports injuries, patients are both eager for surgery and worry about the unsatisfactory results of the surgery, worried about functional recovery after surgery, whether basketball and related sports can be played again; In addition, patients still lack understanding of the application of arthroscopy for anterior cruciate ligament reconstruction surgery.[7] Through pre-surgery education for patients, inform patients of the advantages of arthroscopic surgery with less trauma, less bleeding, definite curative effect, fast recovery, fewer complications, and less surgical scars, etc, and by introducing the cured cases, the patient's worries about the operation are relieved, make patients actively participate in the treatment .[8]

Table 1. Experimental objects.

gender	age	injuries
male	29.2±8.7	Simple ACL injury
female	28.3±6.7	Combined with internal and lateral collateral ligament injuries

Postoperative care

Carefully handover with the nurse in the operating room after the operation, understand the patient's intraoperative position, check the skin condition of the compressed area, especially the limbs with elastic bands during surgery, observe the tightness of the knee brace, know how much bleeding during the operation, changes in blood pressure, check whether the infusion is unobstructed, keep the ward quiet, tidy and comfortable, the room temperature was kept at 22~24 °C after operation.

Monitor vital signs

Observe the patient's vital signs closely after surgery, continuous ECG monitoring, oxygen inhalation, measure blood pressure, pulse, respiration, and blood oxygen saturation once every 30 minutes until stable.[9]

Postoperative position

After the operation, use soft cushions or pillows to raise the affected limb by about 15°~30°, and keep the knee brace in the 0 extension position, the patient took the occiput prone position and tilted his head to one side for 6 hours, apply ice packs to the wound to reduce bleeding, swelling, and pain. Observe the skin temperature of the toes, color, peripheral circulation, movement ability, prevent blood circulation disorders caused by tightly bandaging the affected limb.

Prevention and care of postoperative complications

Infection

Infection is a serious complication after arthroscopic reconstruction of the anterior cruciate ligament. Arthroscopic surgery is a sterile operation, so the infection rate is extremely low. After the operation, the patient's body temperature generally does not exceed 38 °C, if the body temperature rises significantly and the wound has throbbing pain, the wound should be inspected or arthrocentesis should be performed immediately, perform joint fluid smear microscopy, determine whether it is a wound infection, if it is determined to be an infection, anti-infective treatment should be given immediately. None of the 22 patients in this group developed infection.[10]

Pain care

Pain is the most common symptom after surgery, it can trigger the patient's physical and psychological reactions, such as increased blood pressure, faster heart rate, faster breathing, and cause irritability, tension, pain, anxiety and other bad emotions. According to the patient's tolerance and pain score, choose the corresponding analgesic method, the pain score is 3 points and below, psychological counseling should be adopted, by communicating with patients, listening to music and other methods, distract their attention to relieve the pain of the patient; For patients with pain scores above 3, we routinely use analgesic pumps, oral paracetamol and oxycodone and other drugs for treatment.

RESULTS

Table 2 shows the comparison of Lysholm score, active knee flexion range and active knee extension range before and after rehabilitation training.

The knee joint function recovery before and after nursing was compared between the two groups before nursing, comparison of knee joint score and knee flexion and extension, the differences were not statistically significant (P>0.05); After nursing, the knee joint score and knee flexion and extension were significantly greater than before training, and the observation group was larger than the control group, the difference was statistically significant (P<0.05). (Table 3)

According to Lysholm knee score scale and Tegner activity scale, the functional loss and recovery level caused by knee ligament injury were evaluated. The hospitalization time of the patients in this group was 12 to 43 days, with an average of (25.4±8.6) days. (Figure 1) After 2 months of follow-up, 11 cases showed excellent functional recovery, there were 17 cases with good functional recovery and 2 cases with poor functional recovery, the excellent and good rate was 93.3%. After 6 months of follow-up, all patients in this group returned to normal work and life.

Table 2. Comparison of postoperative VAS scores.

Group	Preoperative	Postoperative 3 d
male	7.57 ±1.41	5.43 ±1.32
female	7.62 ±1.36	4.28 ± 1.15
t	0.140	3.598
p	0.445	0.000

Table 3. Comparison of knee function recovery before and after nursing.

group	Time	Knee score	Knee flexion and extension
male	Care before	42.36 ±5.18	16.07 ± 2.83
	After the nursing	62.65 ±7.61	46.55 ± 6.13
female	Care before	42.67 ± 6.03	16.69 ±3.12
	After the nursing	75.77 ±6.82	69.25 ±7.87

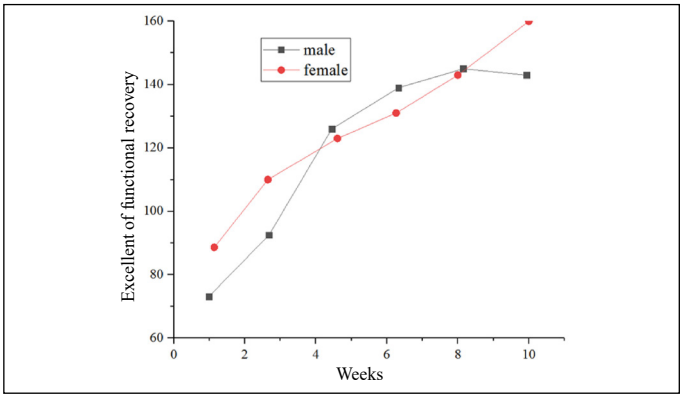

Figure 1. The recovery of ligament injury during the nursing process of the subjects.

DISCUSSION

Patients with anterior cruciate ligament reconstruction under arthroscopy can usually be discharged after the suture is removed 14 days after surgery, it is especially important to develop a detailed and complete rehabilitation plan for the patient when discharged from the hospital. Upon admission, the patient will be filed and reviewed regularly, check and record the knee flexion angle and muscle strength of the knee joint function recovery, follow up after discharge. After the anesthesia disappears, in order to prevent venous thrombosis of the lower limbs, the toe and ankle pumps can be exercised, on the first day after surgery, in order to maintain muscle strength and proprioception, you can walk with weights on crutches, but the knee brace must be locked at 0°, prevent ligament from pulling loose. Only passive knee flexion and extension exercises for 6 weeks, after 6 weeks, gradually perform active flexion and extension training within the normal range of the knee joint, at the same time, it is necessary to strengthen the training of the straight leg raising of the affected limb and the resistance exercise of the quadriceps, make the affected limb gradually return to normal activities. Full functional training in 6 to 8 weeks, to further strengthen the training of muscle strength, maximum resistance exercise and progressive resistance exercise quadriceps strength, at the same time, perform terminal knee extension exercises and quadriceps traction exercises. The affected limb fully resumes normal activities, but still can't run, half squat exercises can be done for 10 weeks, with the goal of gradually achieving and continuing to maintain normal joint mobility, and restore the coordination of muscle movement around the knee joint, gradually improve muscle strength. As can be seen from this group of patients, most patients after ACL reconstruction are afraid of pain, lack of awareness of active exercise, nurses should begin patiently and meticulously explain the relevant knowledge of ACL rupture to the patient when the patient is admitted to the hospital, emphasize the importance of postoperative joint function exercise and guide patients to learn how to exercise.

CONCLUSION

Knee cruciate ligament reconstruction has gradually increased with the development of arthroscopic technology, the cruciate ligament plays a very important role in the stability of the knee joint, timely treatment, good care, and correct functional exercise are of great significance to the recovery of sports function. The 30 patients in this group recovered well when they were followed up six months later. Practice has proved that this nursing program is positive and effective, consolidate the effect of the treatment and promote the recovery of the patient's motor function. According to the analysis of pain, swelling, degree of knee flexion, joint stability, etc., among the 22 patients in this group, the effect of targeted postoperative care and functional exercise was excellent in 18 cases, accounting for 81%; 3 cases were good, accounting for 14%; and 1 case was moderate, accounting for 4.5%.

All authors declare no potential conflict of interest related to this article

AUTHORS' CONTRIBUTIONS: Each author made significant individual contributions to this manuscript. Fengjuan Zhang: writing and performing surgeries; Xiaoyong Chen: data analysis and performing surgeries, Huiyan Li: article review; Chunli Wang: intellectual concept of the article.

REFERENCES

1. Grass F, Lovely JK, Crippa J, Hübner M, Mathis KL, Larson DW. Potential Association Between Perioperative Fluid Management and Occurrence of Postoperative Ileus. Diseases of the Colon & Rectum. 2020;63(1):68-74.
2. Zhang H, Wu X, Xu Z, Sun Z, Zhu M, Chen W et al. Impact of perioperative red blood cell transfusion on postoperative recovery and long-term outcome in patients undergoing surgery for ovarian cancer: A propensity score-matched analysis. Gynecologic Oncology. 2020;156(2):439-45.
3. DeFroda SF, Goodman AD, Gil JA, Owens BD. Epidemiology of Elbow Ulnar Collateral Ligament Injuries Among Baseball Players National Collegiate Athletic Association Injury Surveillance Program, 2009-2010 Through 2013-2014. American Journal of Sports Medicine. 2018;46(9):2142-7.
4. Arya S, Binney ZO, Khakharia A, Rajani RR, Brewster LP, Goodney PP et al. RS02. High-Dose Perioperative Statins Are Associated With a Lower Risk of Postoperative and Long-Term Amputation in Patients Undergoing Revascularization for Peripheral Arterial Disease (PAD). Journal of Vascular Surgery. 2016;63(6):49S-50S.
5. Khayambashi K, Ghoddosi N, Straub RK, Powers CM. Hip Muscle Strength Predicts Noncontact Anterior Cruciate Ligament Injury in Male and Female Athletes: A Prospective Study. American Journal of Sports Medicine. 2016;44(2):355-61.
6. Kaplan Y, Myklebust G, Nyska M, Palmanovich E, Victor J, Witvrouw E. Injuries can be prevented in contact flag football!. Knee Surgery Sports Traumatology Arthroscopy. 2016;24(6):2002-8.
7. Ke P, Ji FH, Liu HY, Zhang J, Chen QC, Jiang JH. Effects of Perioperative Dexmedetomidine on Postoperative Mortality and Morbidity: A Systematic Review and Meta-analysis. Clinical Therapeutics. 2019;41(1):138-54.
8. Wang Y, Wang M, Chen H, Li G, Li Q, Luo J et al. Early Out-of-Bed Functional Exercise Benefits Elderly Patients Following Hip Fracture: A Retrospective Cohort Study. The Tohoku Journal of Experimental Medicine. 2018;246(4):205-12.
9. Jensen BT, Laustsen S, Jensen JB, Borre M, Petersen AK. Exercise-based pre-habilitation is feasible and effective in radical cystectomy pathways—secondary results from a randomized controlled trial. Supportive Care in Cancer. 2016;24(8):3325-31.
10. Barakat HM, Shahin Y, Khan JA, McCollum PT, Chetter IC. Preoperative Supervised Exercise Improves Outcomes After Elective Abdominal Aortic Aneurysm Repair: A Randomized Controlled Trial. Annals of Surgery. 2016;264(1):47-53.