RESEARCH ON STABILITY OF ATHLETE KNEE QULUS LIGTE RECONSTRUCTION

PESQUISA SOBRE A ESTABILIDADE DA RECONSTRUÇÃO DE QULUS LIGTE DE JOELHO DE ATLETAS

INVESTIGACIÓN SOBRE LA ESTABILIDAD DE LA RECONSTRUCCIÓN DE QULUS LIGTE DE RODILLA DE ATLETAS

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ABSTRACT

Introduction: ACL injury of the knee joint is common in sports. Due to the special characteristics of strong physical confrontation and high speed, basketball has a high risk of ACL injury. Objective: To investigate the stability of anterior cruciate ligament (ACL) reconstruction on knee injury in athletes. Methods: In the south, medical research selected 3 cases of unilateral injuries in men's basketball athletes with arthroscopic anterior cruciate ligament autogenous tendon revascularization. We started collecting and recording data of three players three days after rehabilitation training, at various stages in the process Results: At the end of rehabilitation training, 10 weeks after operation, the pain disappeared, the range of motion of the knee joint increased significantly, muscle atrophy of bilateral lower limbs diminished, knee joint stability improved, knee joint muscle strength of the affected leg strengthened, and the rehabilitation goal was basically accomplished. Conclusions: Early rehabilitation training can effectively restore the movement function of the patient's knee joint, improve the efficiency of rehabilitation and shorten the rehabilitation period, thus helping the injured individual recover from the injury and return to the game rapidly. ***Level of evidence II; Therapeutic studies - investigation of treatment results.***

Keywords: Arthroplasty; Knee; Anterior cruciate ligament reconstruction.

RESUMO

Introdução: Lesões de LCA em juntas do joelho são comuns nos esportes. Devido às características especiais, como o confronto físico intenso e a alta velocidade, o basquete apresenta alto risco de lesão de LCA. Objetivo: Investigar a estabilidade de reconstrução do ligamento cruzado anterior em lesões do joelho em atletas. Métodos: No Sul, uma pesquisa médica selecionou 3 casos de lesões unilaterais em atletas do basquete masculino com revascularização do tendão autógeno ligamentar cruzado anterior por artroscopia. Iniciamos com a coleta e registro de dados de três jogadores três dias após treinos de reabilitação, em vários estágios do processo. Resultados: ao completar o treino de reabilitação, 10 semanas após a cirurgia, a dor desapareceu, a amplitude do movimento do joelho aumentou consideravelmente, a atrofia muscular bilateral dos membros inferiores diminuiu, a estabilidade da articulação do joelho melhorou, a força muscular da junta do joelho da perna afetada aumentou e o objetivo da reabilitação foi alcançado. Conclusão: O treinamento precoce com exercícios pode efetivamente restaurar a função móvel da junta do joelho do paciente, aumentar a eficiência da reabilitação e encurtar o período de reabilitação, dessa forma auxiliando o indivíduo com a lesão se recuperar e voltar a jogar mais rapidamente. ***Nível de evidência II; Estudos terapêuticos – investigação de resultados de tratamento.***

Descritores: *Artroplastia; Joelho; Reconstrução do ligamento cruzado anterior.*

RESUMEN

Introducción: Lesiones de LCA en articulaciones de la rodilla son comunes en los deportes. Debido a las características especiales, como el confronto físico intenso y la alta velocidad, el baloncesto presenta alto riesgo de lesión de LCA. Objetivo: Investigar la estabilidad de reconstrucción del ligamento cruzado anterior en lesiones de rodilla en atletas. Métodos: En el Sur, una investigación médica seleccionó 3 casos de lesiones unilaterales en atletas del baloncesto masculino con revascularización del tendón autógeno del ligamento cruzado anterior por artroscopia. Iniciamos con la recogida y registro de datos de tres jugadores tres días después entrenamientos de rehabilitación, en varias etapas del proceso. Resultados: Al completar el entrenamiento de rehabilitación, 10 semanas tras la cirugía, el dolor desapareció, la amplitud del movimiento de la rodilla aumentó considerablemente, la atrofia muscular bilateral de los miembros inferiores disminuyó, la estabilidad de la articulación de la rodilla mejoró, la fuerza muscular de la articulación de la rodilla de la pierna afectada aumentó y el objetivo de la rehabilitación se alcanzó. Conclusión: El entrenamiento temprano con ejercicios puede efectivamente restaurar la función de movilidad de la articulación de la rodilla del paciente, aumentar la eficiencia de la rehabilitación y acortar el periodo de rehabilitación, de esa forma, auxiliando el individuo con la lesión a recuperarse y volver a jugar más rápidamente. **Nivel de evidencia II; Estudios terapéuticos – investigación de resultados de tratamiento.**

Descriptores: *Artroplastia; Rodilla; Reconstrucción del ligamento cruzado anterior.*

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INTRODUCTION

Knee movement is the most complicated biomechanical movement of the joint. Walking is the most frequent movement mode of knee joint, which is easy to measure and can be analyzed accurately in biomechanical analysis of knee joint.[1] The anterior cruciate ligament (ACL) of the knee is an important statically stable structure of the knee. There are mechanical receptors on the surface of the ACL, which regulate the dynamic stable structure, namely the muscle group around the joint, through neuromuscular reflex. After ACL injury, the change of reflex arc will cause the compensatory change of muscle force of the perigenicular muscle group, and then lead to the change of gait.[2] This gait change can be measured by professional gait analysis system, which can objectively reflect the functional state of subjects' knee when walking at a quantitative level. Similarly, the anatomical reconstruction of ACL also has a certain influence on the function of the knee joint. Therefore, accurate quantitative measurement of gait is helpful to understand the kinematics and kinemechanical changes of knee joint after ACL injury and treatment.

Although the strength of the iliotibial band measured by mechanics with other autogenous structures is only 30% ~ 40% of that of the anterior cruciate ligament, there are many researches at home and abroad. Herbst E, Hoser C et al. proposed that the use of iliotibial band transplantation did not affect the stability and muscle force balance of the knee joint after surgery, and the application effect was good, therefore, it is considered to be an ideal material for anterior cruciate ligament reconstruction.[3-4]

METHOD

Subjects

In this study, the effect of early rehabilitation training on the function improvement of male basketball players after ACL reconstruction was taken as the research object. Three male basketball players who underwent ACL auto-tendon reconstruction under unilateral arthroscopy in the Third Hospital of Beijing Medical University were selected as the experimental subjects for case analysis. The basic information of the three patients is shown in Table 1.

Three patients underwent autologous hamstring anterior cruciate ligament reconstruction within 25-35 days after anterior cruciate ligament rupture. The surgery was performed arthroscopically by the same treatment group of physicians from the Third Hospital of Beijing Medical University, all the three patients were diagnosed with simple anterior cruciate ligament rupture without meniscus suture, and the preoperative conditions and functions of the patients were basically the same. Rehabilitation training was started 3 days after the operation, and fixed during sleep in one week within 2 weeks after the operation, but not fixed at ordinary times. The muscle strength of the left lower limb decreased, including iliopsoas muscle, gluteus medius muscle, quadriceps femoris, hamstring muscle.[5]

Rehabilitation training

Pain in the process of rehabilitation training is a normal phenomenon, as long as the degree of pain caused by the training on the day is not greater than the degree of pain after the previous day's training, if the pain is relieved within half an hour after the end of training, it is normal that no injury will be caused. During rehabilitation training, joint swelling and fever are normal phenomena, which can be alleviated by ice compress. If swelling, fever and other phenomena continue to be serious and there is no progress in joint Angle for a long time, the amount of activity and training should be reduced immediately, and timely return to the doctor.[6] The following are the specific principles of rehabilitation training after ACL reconstruction:

1. Range of motion:

Recovery began on day 3 after reconstruction and reached 90° 2 weeks later, with weekly increases of 15° thereafter.

Weight bearing: no weight bearing within 1 week; At week 2, the crutches began to bear some weight. At the 4th week, the crutches began to bear full weight. Go after 4 weeks.

Support: within 2 weeks, 0° straightening fixed; From the 3rd week, it was adjusted to the movable brace, 0-30°; Increase by 15° per week thereafter; At the end of 4 weeks, sleep to braces; After 8 weeks, the brace was removed.

- Treadmill: Start at the end of 6 weeks.
- Swimming: Starting at 3-4 months.
- Constant speed: Starting from 2 months.

Table 1. Basic data of experimental subjects.

Name	Height	Weight	Age	Sports level	Fixed number of year of the movement	One side	Rehabilitation intervention time
Wu Mou	192	95	28	Level 1	12	His left knee	After 3 days
Ye Mou	185	84	21	Level 2	7	Right knee	After 3 days
Wang mou	189	90	24	Level 2	10	His left knee	After 3 days

RESULTS

Range of motion

The knee flexion Angle of the affected side of three patients undergoing ACL reconstruction was selected as a statistical index, and the changes of this index before and after rehabilitation training were shown in Figure 1 and 2.[7]

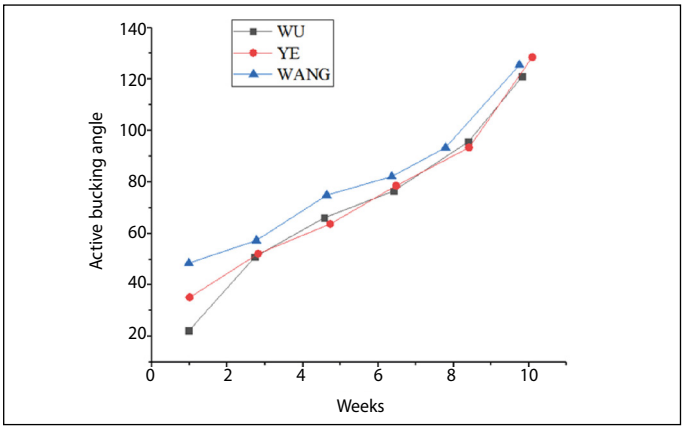

Figure 1. Change of active flexion Angle of the affected knee during the rehabilitation process of the subject (unit: degree).

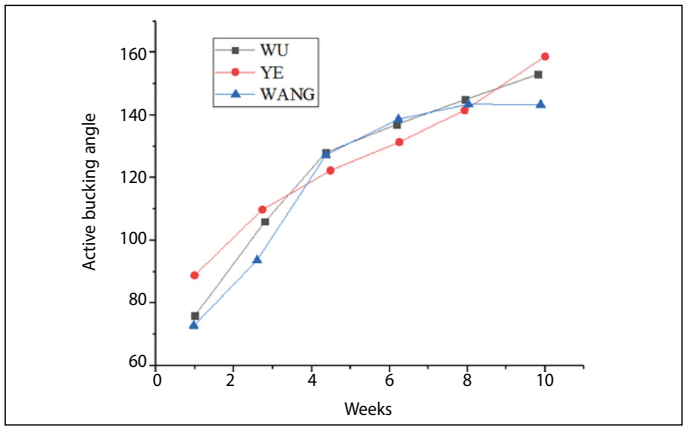

Figure 2. Change of passive flexion Angle of the affected knee during the rehabilitation process of the subject (unit: degree).

As shown in Figure 2, the subjects were also slightly limited in the passive flexion of both knee joints at the early stage of rehabilitation. After 24 weeks of rehabilitation training, the passive flexion Angle of the knee joints on the affected side of the three patients increased from 84° ~ 92° to 148° ~ 154°, the maximum increase was 64°. Passive knee flexion Angle changes greatly in the early stage of rehabilitation, and gradually decreases with the progress of rehabilitation, and finally tends to be stable. This indicates that the effect of early rehabilitation is very obvious, showing the importance of early rehabilitation in the whole rehabilitation process.[8] Evaluation criteria of knee joint motion: normal extension and flexion of knee joint, optimal flexion of 135° ~ 145°; Normal knee extension, good flexion of 120° ~ 134°; Normal knee extension, flexion of 95° ~ 119° can be; The range of motion of the knee less than 95° is the difference.

Circumference of lower limbs

The 10cm suprapatellar circumference of the patients' bilateral lower limbs was selected as the measurement index. The changes of this index before and after rehabilitation training were shown in Table 2, 3, and 4.

Table 2. Changes in the circumference of Wu's lower extremities during his rehabilitation (unit: cm).

Date (postoperative)	2 weeks	4 weeks	6 weeks	10 weeks
In the left knee cap 10cm	49.6	49.4	50.1	50.5
On the right patellar 10cm	50.5	50.3	50.6	50.9

Table 3. Changes in circumference of both lower extremities of Ye during rehabilitation (unit: cm).

Date (postoperative)	2 weeks	4 weeks	6 weeks	10 weeks
In the left knee cap 10cm	47.2	46.9	47.2	47.5
On the right patellar 10cm	46.3	46.0	46.5	47.0

Table 4. Changes in circumference of lower extremities of Wang during rehabilitation (unit: cm).

Date (postoperative)	2 weeks	4 weeks	6 weeks	10 weeks
In the left knee cap 10cm	45.4	45.2	45.5	45.6
On the right patellar 10cm	44.3	44.2	44.5	45.1

DISCUSSION

As shown in Table 2, 3 and 4, the affected side increased by 1.4cm on the 10cm suprapatellar side and the healthy side increased by 0.6cm on the 10cm suprapatellar side of Wu, and the circumference difference of both lower limbs decreased by 0.8cm. At 10cm above iliac, the affected side increased by 1.2cm and the healthy side increased by 0.5cm, and the circumference difference of both lower limbs decreased by 0.7cm. In Wang, the affected side at 10cm suprapatellar increased by 1.1cm and the healthy side increased by 0.4cm, and the circumference difference of bilateral lower extremities decreased by 0.7cm. Three patients in the early rehabilitation on lower limb patellar 10 cm surrounded degree has different degree of atrophy, muscle atrophy with the deepening of the rehabilitation process conditions were improved, through 24 weeks of rehabilitation training, the anteromedial thigh circumference relatively early rehabilitation all have different degree rise, bilateral lower limbs is surrounded degree difference became smallerearly rehabilitation.[9]

In this study, the range of motion of three male basketball players after anterior cruciate ligament reconstruction was significantly improved compared with that at the initial stage of rehabilitation. After surgery, passive joint movements were performed on all three patients twice a day at the maximum Angle for 5 to 10 minutes.Joint activities from passive activities, to active borrowing activities and finally active activities, and adopted ankle pump exercises, active knee flexion and extension, straight leg raising and other training methods. After the exercise, ice compress was selected according to the self-perception of knee temperature. Loose at the same time, the patella in rehabilitation training two weeks after the start, it can rebuild the patellarin femoral block in all directions (up, down, inward and outward movement of patellar loose to regain the patellar activity and prevent postoperative adhesion is essential, patient, rehabilitation exercise on a daily basis for 5 ~ 10 minutes before the patella is loose.[10] Evaluation criteria of knee joint range of motion proposed by Pang Zaili: The knee joint was normal in extension and flexion, and the optimal flexion was 135° ~ 145°. Normal knee extension, good flexion of 120° ~ 134°; Normal knee extension, flexion of 95° ~ 119° can be; The range of motion of the knee less than 95° is the difference.[11]

After 10 weeks of rehabilitation training, the knee joint of the three patients was significantly improved, with the maximum increase reaching 52 points, and the knee joint function and daily basic living ability of the three patients were all restored.[12]

CONCLUSION

The stability of anterior cruciate ligament (ACL) reconstruction for knee joint injury in athletes was studied. The specific content of this method is 1. The effect of early rehabilitation training on the function improvement of male basketball players after ACL reconstruction is taken as the research object. 2. Rehabilitation training; 3. Through experimental observation, the knee joint activity of the three patients was severely limited in the early stage of rehabilitation, and the daily basic living ability was impaired. After 10 weeks of rehabilitation training, the knee joint of the three patients was significantly improved, with the maximum increase of 52 points, and the knee joint function and daily basic living ability of the three patients were restored. To prove that the reconstruction of the anterior cruciate ligament (ACL) has a certain stability in the repair of knee injury in athletes.

The author declare no potential conflict of interest related to this article

AUTHORS' CONTRIBUTIONS: This paper is independently completed by the author, Kuolin Zhang: data analysis and article writing.

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