ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Evaluation Of The Effectiveness Of The Option Of Physical Rehabilitation Of Athletes Who Have Undergone Plastic Anterior Cruciate Ligament Of The Knee Joint.

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ABSTRACT

A knee joint is very often injured in a person, while of all intra-articular formations in it with injuries in approximately 70% of cases the anterior cruciate ligament is damaged. Her surgical treatment is now carried out using modern technologies aimed at maximum preservation of proprioceptors in the knee joint, which allows to achieve the most complete restoration of the functions of the knee joint. Athletes are at particular risk for injury to the knee. In this regard, the developed rehabilitation program after surgical treatment of the anterior cruciate ligament was tested on them. Using this rehabilitation scheme turned out to be able to correct lymphatic drainage in the injury area, helping to reduce the patient's recovery time and reducing the manifestation of osteoarthritis symptoms in the future. The used complex of physical rehabilitation in the form of its complexity, consistency of application, continuity of impact, continuity of its health stages, the possibility of individualization of the impact, contributes to the high efficiency of this rehabilitation program for patients who have undergone anterior cruciate ligament repair in the knee joint.

Keywords: knee joint, anterior cruciate ligament, physical rehabilitation, recovery, performance.

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ISSN: 0975-8585

INTRODUCTION

The course of ontogenesis is often accompanied by the development of various disorders in the body, often caused by exposure to environmental factors of excessive intensity [1-5]. As a result, non-communicable diseases [6–9], various kinds of dysfunctions [10–13], and sometimes injuries [14–17] are often registered. It is injuries that are very dangerous with their consequences in relation to vital organs [18,19] and organs of movement [20-25].

One of the most susceptible joints of the human body is the knee joint. At the same time, of all intraarticular soft tissue formations of the knee joint with injuries, in approximately 70% of cases the anterior cruciate ligament is damaged [26,27]. Surgical treatment of injuries of the anterior cruciate ligament with the use of modern technologies is aimed at maximal preservation of proprioceptors in the knee joint, which allows to achieve the most complete recovery of its neuroreflex and proprioceptive functions [28-30].

Athletes are at particular risk for joint injuries. In the process of regular sports training, with an increase in the volume and intensity of physical exertion in the athlete's body, morphological, functional, biomechanical shifts occur, contributing to an increase in sports performance [31]. At the same time, the training process often against the background of the load on individual muscle groups, falls, inadequate construction of the recovery period often causes multiple injuries of the musculoskeletal system, often with severe pain syndrome [32]. The most dangerous in terms of movement of the knee injury with damage to the anterior cruciate ligament. They are promoted by skiing, contact and playing sports with “ragged” accelerations and sudden braking [33], as well as ballet, ballroom and sports dancing, all kinds of wrestling. In the process of occupying them, there is a main mechanism for the development of anterior cruciate ligament injury - rotation in the knee joint at the time of reliance on the limb [34,35]. In winter, representatives of alpine skiing prevail among patients, and in the summer, footballers become leaders in this trauma [36–39].

It is known that about 70% of patients and including athletes return to the original functional level after the operation, about 10% of the operated patients experience dysfunctions of the knee joint, which prevent them from performing the same physical activity [40-45].

Until now, opinions of trauma surgeons and specialists-rehabilitators aspects, timing and methods of immobilization, timing of motor activity of patients, the time of full load and full range of motion in the knee joint, the criteria for assessing recovery of the knee joint was significantly different [46,47]. In respect of the knee joint with the above, it is urgent to develop a program of staged physical rehabilitation after repair of the anterior cruciate ligament using a rational approach to the restoration of the anatomic-morphological structure of the damaged knee joint and functional status of patients [48,49].

The purpose of this study was to assess the effectiveness of the developed program of physical rehabilitation after repair of the anterior cruciate ligament.

MATERIALS AND METHODS

The study was approved by the local ethical committee of the Russian State Social University on 2016/12/20 (protocol №12).

Under the supervision of men were - 12 professional athletes and 9 amateur athletes involved in football, hockey, athletics and volleyball. All patients were in the age group of 30-39 years. All of them were successfully operated on with plasty of the anterior cruciate ligament of the knee joint from its own patellar ligament.

The applied rehabilitation program consisted of several stages with a total duration of 3-6 months. At the first stage (1st month after surgery), they sought to stop pain and swelling, to achieve full extension of the knee joint, flexion of the knee joint to no less than 90°, restoration of control over the thigh muscles, improvement of the formation of a correct gait. This was achieved during the use of a complex of rehabilitation measures, which included individual exercises in the gym, physical therapy, physiotherapeutic effects, apparatus lymphatic drainage massage, electrical stimulation of the muscles of the problem limb, and daily development of the «Fisiotek» passive extension apparatus. Classes in the gym were held 3 times a week

for 40 minutes with the inclusion of exercises on simulators were aimed at restoring the calf muscles and increasing the stability of the axis of the leg. Passive development was carried out daily for 5-7 minutes. At this stage, magnetic therapy and local (in the affected area) cryotherapy were also used, which made it possible to reduce the swelling and manifestations of pain. Apparatus lymphatic drainage massage improved blood circulation and lymph circulation, as well as reduced swelling of the affected limb. During the first month of rehabilitation, the use of crutches was permitted, partial axial load within comfortable and painless sensations, walking in front of the mirror with the use of individual insoles was recommended.

In the second phase of rehabilitation (2 months after surgery) sought to increase the muscle strength of lower limbs, improve the sense of balance of lower extremities. This was achieved through the integrated application of training in the gym 3 times a week by individual programs lasting an hour and a half classes in a hall of therapeutic physical culture, which are held 3 times a week for 30 minutes, in combination with kinesiotaping and the rate of vacuum therapy using the apparatus "VACUMED" (Germany). Gradually stop using the crutches after reaching full active extension of the knee joint.

In the third stage of rehabilitation (3 months after surgery) sought to increase the power of muscles of the thigh and pelvis, their power and endurance without causing pain, contribute to a gradual return to normal physical activity and specific sports training. It was recommended that the full axial load, fully restored the biomechanics of the walk in affected limb without the pain syndrome.

Classes in the gym were held 3 times a week according to individual programs lasting 60-80 minutes, classes of therapeutic physical training were held, or Nordic walking 3 times a week for 30 minutes.

At the fourth stage of rehabilitation (4-6 months after the operation), complete regression of the pain syndrome and edema was achieved when performing specific sports exercises, the development of maximum strength and endurance of the thigh muscles, improvement of neuromuscular coordination, return to normal physical activity. The wearing of an individual carbon fiber orthosis is recommended for up to 1 year after surgery. This stage of rehabilitation included exercises in the gym 3 times a week for 60-80 minutes, Nordic walking three times a week and lymphatic drainage massage.

To assess the stability of the knee joint, functional tests of the anterior cruciate ligament were performed - Lachman, pivot-shift. The angle of flexion and extension in the joint was found out on the «Fisiotek» passive apparatus (Germany). The level of edema was assessed visually and using a measuring tape.

The obtained results were processed using a package of standard statistical programs.

RESULTS OF INVESTIGATION AND DISCUSSION

As a result of the implementation of the rehabilitation program, the edema of the periarticular tissues of the operated joints, and the postoperative pain syndrome regressed more quickly than with traditional rehabilitation [23]. Preliminary holding of a local lymphatic drainage massage promoted an increase in the range of movements in the knee joint on the «Fisiotek» apparatus by an average of 3 degrees. 2-3 weeks after the beginning of the first stage of the program, the angle of flexion in the knee joint was 110 degrees or more on the passive mobilization apparatus (and not by the end of the first month, as is usually the case). So, before the rehabilitation, the angle of flexion in the knee joint was 79.7±23.16 degrees, at the end of the course of passive development on the «Fisiotek» apparatus –121.5±24.25 degrees ($p<0.01$). In almost all patients after the «VACUMED» procedures, the lower leg edema decreased and corresponded to that on the non-operated limb.

According to the results of the rehabilitation program, all patients showed positive dynamics of the general condition - the absence of pain, edema, restoration of sensitivity, an increase in the range of movements in the affected limb with a shortening of recovery time after surgery and a significant improvement in the psycho-emotional background.

All patients who received a comprehensive staged rehabilitation, fully recovered from injury. Of the 12 professional athletes, 11 people returned to the sport (hockey, football, basketball). Some left the sport for

personal reasons. Of the 9 amateur athletes, 6 months after the operation, all reached the level of fitness before injury.

After 4 years of follow-up of patients after rehabilitation on the background of adequate lymphatic correction, two (16.7% of the total number of rehabilitants) were diagnosed with deforming arthrosis of the knee, for which they were prescribed appropriate treatment. This is better than the results known from the literature, according to which in the next 5 years after surgery up to 42% of patients have signs of arthrosis.

CONCLUSION

The program of physical rehabilitation of large after surgical treatment of damage to the anterior cruciate ligament of the knee joint, tested in the study, showed its high efficiency. The opportunity during its implementation and taking into account the individual characteristics of the organism has provided athletes the opportunity to return to sports. The success achieved was largely due to the use of effective lymphatic drainage in the injury area in this rehabilitation scheme. This contributed to a reduction in the timing of the restoration of the function of the knee joint and a decrease in the manifestations of symptoms of osteoarthritis in the future, besides being successful. The complex used was based on its complexity, the sequence of application of the components, the continuity of the process of exposure, the succession of its stages and the individual approach during the implementation of this rehabilitation program.

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