

REHABILITATION OF ATHLETES AFTER SURGICAL INTERVENTION ON THE ACHILLES TENDON.

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Abstract: Rehabilitation of athletes after surgical intervention on the Achilles tendon. The frequency of injuries to the Achilles tendon increases every year in the population, since most people lead a sedentary lifestyle, but periodically show interest in physical activity. Most Achilles tendon injuries occur during sports games where rapid acceleration / deceleration and jumping are required, so professional athletes are most at risk of injury to the Achilles tendon. Currently, there are no approved requirements for the rehabilitation treatment of patients after surgical treatment of the Achilles tendon. Based on clinical experience, we have compiled a postoperative rehabilitation program for the management of patients, consisting of 4 stages. This program can be simplified or complicated, its duration can be shortened or lengthened, depending on the individual characteristics of a particular patient.

Key words: *achilles tendon, surgery, rehabilitation.*

Text of the article: The rehabilitation program begins from 2 to 6 weeks after surgery on the Achilles tendon. Special attention should be paid by the rehabilitation specialist to ensure the protection of the operated area. For example, it is imperative to avoid passively stretching the Achilles tendon for at least 12 weeks after surgery. In addition, the axial load should be increased gradually and in coordination with the operating surgeon. The rehabilitation therapist should consider the phases of tendon healing (the phase of inflammation, proliferation, formation and organi-

zation of scar tissue) throughout the entire postoperative rehabilitation program. The Achilles tendon is most weakened during the first 6 weeks (phases of inflammation and phases of proliferation), and then slowly strengthens over the next 6 weeks up to 12 months (formation and organization of scar tissue) [1,2].

Postoperative stage I: providing protection and conditions for regeneration (from 1 to 6 weeks).

Recovery in the first phase of the postoperative rehabilitation program consists of controlling swelling and pain, minimizing scar tissue formation, and ensuring adequate range of motion. The exercise limitation lasts 2 to 8 weeks after surgery. Currently, with the development of surgical and rehabilitation methods, the postoperative approach consists in fixing the operated limb with an unloading boot and walking with a partial load on the limb using crutches. Early mobilization and axial load limitation are the main directions in the first stage after surgery.

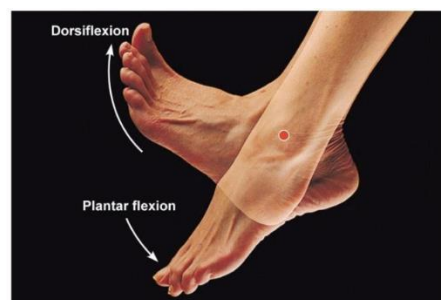


Fig. 1. (A) Active range of motion with the knee flexed in the direction of plantar flexion and (B) dorsiflexion

The regeneration of the tendon and the return of muscle strength is facilitated by partial axial loading and active movements in

the joint, while at the same time preventing the negative consequences of im-mobilization (muscle atrophy, joint stiffness, the development of arthrosis, the formation of adhesions and deep vein thrombosis) [3, 4]. The patient is trained to perform an active range of motion: dorsiflexion, plantar flexion, inversion and eversion several times a day. The range of motion of active extension is limited to 0 degrees (neutral position) with the knee joint bent to an angle of 90 degrees (fig. 1, A and B).

As soon as the patient moves from partial to full load on the operated limb, work on a stationary bike with minimal resistance is added to the rehabilitation program. The patient should avoid putting pressure on the forefoot while riding a stationary bike, with the heel being the main load. Massage and gentle mobilization of the Achilles tendon is used to speed up the regeneration process and help avoid adhesions and scarring and joint stiffness. Cryotherapy and elevated position of the operated limb are used to control swelling and pain. The patient must avoid prolonged exposure to the same type, fixed position. During the day, it is necessary to bring the operated limb to an elevated position. It is also recommended to apply dry cold compresses several times a day for 20 minutes on the operated area.

Postoperative stage II: early mobilization (6 to 12 weeks)

The second postoperative stage consists in increasing the axial load, increasing the movements of the operated limb and gradually strengthening the muscles. First, the patient increases the axial load with a fixed foot in the orthosis, walks with crutches, and then begins to walk independently without additional support. Using a heel pad provides an easier transition from an orthosis (which often has a plantar flexion of 20 to 30 degrees) to a casual shoe. The size of the heel should gradually decrease as the range of motion increases, and the heel should not be used once the patient has achieved normal gait biomechanics. At this stage of rehabilitation, it is expected to

increase the amount of movement sufficient to return to daily activities. During this stage, pronation and supination of the foot is carefully performed in an isometric mode, further adding resistance exercises with an elastic band. Strengthening the muscles of the lower leg continues by drawing letters of the alphabet with your foot in the air. After increasing the range of motion, the muscles of the back of the lower leg are strengthened. At the 6th week, exercises for plantar flexion resistance are introduced with the knee bent at an angle of 90 degrees (pic. 2, A). At the 8th week, resistance to plantar flexion is performed with the knee joint extended to 0 degrees (pic. 2, B).



A



B

Fig. 2. (A) Progressive resistive exercise using an elastic band to strengthen the planter flexors with the knee flexed and (B) with the knee straight

Continue training on a stationary bike with an increase in the axial load on the fore-foot. Backward walking is introduced into the treadmill rehabilitation program to facilitate plantar flexion. Patients usually find walking backwards very comfortable, since such walking eliminates the need to push off [5]. The incline of the treadmill gradually increases (10, 15, and 20 cm) as you adapt. Early neuromuscular training and increased range of motion are recommended to be performed using

unstable platforms in a sitting position with further exercise in a standing position. In addition, two-legged exercise on an unstable platform promotes deep proprioception, neuromuscular training, and coordination. Exercises begin to be performed on two legs and with an increase in muscle strength they switch to exercises on one leg (pic. 3). Local massage, soft tissue mobilization continues as needed.



Fig.3. *Unilateral range of motion and neuromuscular training, using a biomechanical ankle platform system*

Postoperative stage III: early muscle strengthening (12 to 20 weeks)

When the recommended requirements of the previous stage are fulfilled, the patient goes to the III stage of rehabilitation, designed to completely restore active movements, normalize the strength of the plantar flexor muscles, and improve coordination and neuro-muscular control. The degree of restoration of the strength of the plantar flexor muscles is determined by the patient's ability to perform heel lifts while standing on two legs and later on standing on one leg [6]. Work on the development of strength, endurance, coordination begins, provided that the patient performs movements smoothly and technically.

By the end of this stage, complete restoration of limb symmetry is expected. The patient needs to maintain the achieved level of functional activity by increasing the deficit in range of motion and / or muscle strength. The most common complication of this stage is the presence of complaints of muscle pain or tendonitis during more technically difficult exercises.

Achilles tendinitis and / or pain in the area of the Achilles tendon is the most common complication of stage II rehabilitation. Increasing the level of physical activity as soon as the patient stops walking with crutches or wearing an unloading boot, increasing the range of motion and strengthening exercises too quickly during the rehabilitation program can lead to pain and inflammation. The patient's subjective complaints and objective indicators of his condition are analyzed by a rehabilitation specialist during the expansion of the rehabilitation program. The patient's attention should be drawn to the need to carry out an exercise program at home.

Postoperative stage IV: consolidation (20 to 28 weeks)

The program of this stage of rehabilitation is designed to prepare the patient / athlete for a safe return to active sports activities. On the 20th week after the operation, isokinetic testing of the ankle joint of plantar flexion, dorsiflexion, inversion and eversion is performed. Isokinetic testing allows a more accurate assessment of muscle strength over time than isometric manual testing. Isokinetic testing provides the clinician with objective indicators, which makes it possible to visually assess and monitor the patient's objective condition in dynamics. The test data obtained demonstrate whether the strength and endurance of the calf muscles have recovered. If the test results are within 75% of the opposite limb and the patient performs 10 heel raises on one leg, a treadmill can be added to the rehabilitation program. Running forward on a treadmill is conducted with an emphasis on short distances, from low to medium speed, taking into account the patient's subjective painless sensations when moving. Isokinetic muscle strengthening continues to enhance strength and endurance in dorsiflexion, plantar flexion, inversion and eversion. Resistance and flexibility exercises continue to increase according to the principle of tolerance, and agility exercises are added, depending on the patient's sport. Running and training in sports-specific skills should start with simple movements and then move on to

more complex ones, with changes in trajectory and speed. These steps can be further complicated by adding resistance with elastic band. The greatest emphasis is on doing coordination exercises. However, the exercise is done in conjunction with coordination training to develop control and strength in the ankle muscles. The patient can perform resistance exercises while standing on various unstable surfaces. At this stage, light plyometric exercises are introduced. Due to dynamic stretching and contraction of muscles, endurance increases [7,8].

Postoperative stage V: Return to sports activities (28 weeks - 1 year)

The final stage of rehabilitation can take from 28 weeks to a whole year, depending on the desired level of activity and the patient's physical condition. During this phase, attention should be paid to making up for any remaining deficits in muscle strength and flexibility. Sport-specific, plyometric and agility exercises must be incorporated into the program to meet the functional requirements of the particular sport. Isokinetic exercises are continued to restore endurance to the level required for sports. During this stage, it is necessary to increase the plyometric load by doing exercises on one leg, for example, jumping with one leg from side to side. Functional testing, such as a vertical jump test, can be used to determine if the patient is ready to return to sports activities. The jump test demonstrates the restoration of muscle strength and the presence of functional limitations of the lower limb [9, 10]. It is desirable that the patient exhibits 85% limb symmetry. For a full return to sports activities, the permission of the operating surgeon is required.

The use of this rehabilitation program can be adapted for each patient, depending on his goals and needs. Continuity between surgeon and rehabilitation specialist is of fundamental importance in developing an individualized patient management program from the postoperative period into the flesh to full recovery. Using this program as a basis, subject to an individual approach, will ensure the

achievement of the desired result for each patient.

LITERATURE REVIEW

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AŞIL VƏTƏRİNİN CƏRRAHİ MÜDAXİLƏSİNDƏN SONRA İDMANÇILARIN BƏRPASI

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Annotasiya: əhalidə Aşil tendonunda yaralanmaların tezliyi hər il artır, çünki əksər insanlar oturaq həyat tərzini keçirir, lakin vaxtaşırı fiziki fəaliyyətə maraq göstərir. Aşil tendon zədələnmələrinin əksəriyyəti aşırı sürətlənmə, yavaşlama və atlamanın tələb olunduğu idman oyunları zamanı baş verir və bu səbəbdən də peşəkar idmançılarda Aşil tendonunun zədələnmə riski ən yüksəkdir. Hal – hazırda Aşil tendonunun cərrahi müalicəsindən

sonra xəstələrin reabilitasiya müalicəsi üçün təsdiqlənmiş tələblər yoxdur. Klinik təcrübəyə əsaslanaraq, əməliyyatların sonrakı 4 mərhələdən ibarət reabilitasiya idarəetmə proqramını tərtib etdik. Bu proqram müəyyən bir xəstənin fərdi xüsusiyyətlərindən asılı olaraq, sadələşdirilə və ya mürəkkəbləşdirilə bilər, müddəti qısaldı və ya uzadı bilər.

Açar sözlər: *aşil vətəri, cərrahiyyə, bərpa.*

РЕАБИЛИТАЦИЯ СПОРТСМЕНОВ ПОСЛЕ ХИРУРГИЧЕСКОГО ВМЕШАТЕЛЬСТВА НА АХИЛЛОВОМ СУХОЖИЛИИ

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Аннотация: Частота повреждений ахиллова сухожилия с каждым годом увеличивается в популяции, так как люди в большинстве своем ведут малоподвижный образ жизни, но периодически проявляют интерес к физической активности. Большинство травм ахиллова сухожилия происходит во время спортивных игр, где необходимы резкие ускорения, замедления и прыжки, поэтому профессиональные спортсмены наиболее подвержены риску травматизации ахиллова сухожилия. В настоящий момент отсутствуют утвержденные требования к восстановительному лечению паци-

ентов после оперативного лечения ахиллова сухожилия. Основываясь на клиническом опыте, нами было составлена послеоперационная программа реабилитационного ведения пациентов, состоящая из 4 этапов. Данную программу в зависимости от индивидуальных особенностей конкретного пациента, можно упрощать или усложнять, сроки ее проведения можно сокращать или удлинять.

Ключевые слова: *Ахиллово сухожилие, оперативное вмешательство, реабилитация.*